THE IRON TRADE REVIEW

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CLEVELAND, O., MARCH 12, 1891.

THE WEEK IN IRON CIRCLES.

General Features. From Chattanooga comes the important information that the product of the basic steel plant at that place has achieved some remarkable triumphs in recent tests, setting at rest any question as to the superior quality of this newly introduced metal in the United States, and the adaptability of Southern high phosphorus ores to making highest grade of open-hearth basic steel. It is difficult at the present writing to measure the far-reaching results that may follow the above achievement, but that it will have great influence upon the development of Southern industries goes without saying. A glance at the general aspect of the iron market reveals the fact that the rolling mills are doing scarcely any business; the stove men report a falling off in trade; and the railroads are scarcely buying at all, though their officers state that they are in need of supplies, but are compelled to retrench. As this, however, has been going on for some time, it is thought that they will have to come on to the market and buy heavily before long. Car works report prospective orders, but the amount of work already booked is light, and will not enable them to run full. The Chicago market has not shown any large amount of buying during the week. The Southern furnaces in particular are maintaining a very firm front as to prices and long-scattered deliveries, in many cases being sold up for two or three months ahead, and in others entire supply of certain grades being contracted for well into the future. Lake Superior charcoal irons still remain very quiet. It is certain that present prices on metal of this class cannot continuously remain an existing basis as cost has been reached, and in some cases exceeded, by the extremely low prices which have been ruling for a number of weeks. The most important feature developed in the Detroit pig iron market last week was the continued call for Lake Superior charcoal, particularly in the East, where manufacturers seem to be alive to the fact that the market is a low one; that while probably there will be enough iron to go round without any trouble, they believe the only fluctuation in this grade of metal must be an upward one, inasmuch as the cost limit is what prices are down to at the present time. Some inquiry for Southern iron was seen, and a few transactions were closed, but were not noticeable for their size, and can hardly be said to reflect the Southern market. No large transactions whatever have been reported to us. Altogether the position of the market can be said to be the same. The same conditions prevail at Cincinnati as described in last report. Other furnaces have joined the inactive list in consequence of the coke strikes, and there are increasing signs of scarcity of iron in certain quarters. There has been a moderate increase in production in the South, but there are still many idle stacks. Prices are up about 75 cents per ton both North and South. Some sales have been made at a greater advance, and others are reported at a little under the full advance. The tendency of the market is toward greater firmness, as it is felt that light production and increasing stocks must make their influence felt. Ohio softeners and charcoal irons are moving rather more freely, but at unchanged prices. General consumption of iron and steel is somewhat curtailed, but runs beyond expectations that had been formed. Sales at St. Louis continue light and prices are somewhat better than the first week in February. The Louisville market has been very quiet; a sale of 1,000 tons basis of $10.75 Birmingham, being the highest price at which grey forge was sold, and this was for a favorite brand. Lake Superior car wheel was offered here as low as $20.00, the price being as low as this grade has ever been sold at here. The coke strike has advanced iron to the basis of $10.75 for grey forge Birmingham, and what sales are made are generally for prompt delivery, as buyers are not willing to purchase on this basis for shipment at the latter part of the year. The coke strike in Connellsville district is still unsettled. At a meeting of the coke companies and miners on March 2nd, the companies asked a reduction of 10 per cent. in wages, which was rejected by the miners. It is stated that the conference committees adjourned without any fixed date for another meeting, and that there is not the slightest prospect for settlement. A two months' strike confronts the region, and the miners are making vigorous preparations for a long drawn-out struggle.

The Local Situation. The situation is getting more and more complicated every day. What was true yesterday, is no longer a fact to-day, and rumors chase each other all over the country, with astonishing rapidity. Close upon the solemn declaration of the bulk of the iron ore dealers that they expected no market until the end of June, comes the news of the sale, for use in this furnace district, of a round hundred thousand tons of Norrie ore, and the advance in the pig iron lines is offset by the fact that there is none to be had. There had been some rumors, earlier, that the Norrie people had disposed of a million tons of ore to the Illinois Steel Company, and as the latter concern is a heavy stockholder in Norrie, and has always been a large consumer of that ore, the report was in a measure credited. Moreover, such a sale could not possibly affect this market, as the Illinois Steel Company, having a large supply of coke on hand, is enabled to make pig iron without regard to the coke strike, while the valley furnaces necessarily depend upon the settlement of the local troubles for a resumption of activity. Nevertheless, the alleged sale of ore to the Steel Company is explicitly denied by the Norrie people, who, however, report the sale above quoted, at $4.50, which is just a dollar less than last year's prices. Other ore men are firm in their belief that there is not the slightest occasion, at this time, to make even an attempt to sell ore, and the general run of furnacemen certainly entertain no views favorable to the starting up of the various stacks. The settlement of the coal strike, in the immediate vicinity of the coke ovens, will undoubtedly have the effect of strengthening the position taken by the cokers, and will in so far prolong the strike, as to encourage the men to hold out longer than they probably would have done otherwise. The vessel men have had meetings here and in Buffalo, with a view to an agreement to keep their craft out of commission until May 15, and the chances are good that the saving in insurance of 20 per cent., may keep all the heavier lake shipping out of commission until June 1. The vessel owners are agreed that it would be far more profitable to have a short and busy season, than a long and dull one. Pig iron has advanced, but there is so little left, of home make, as to obscure the market, and give the benefit of the raise to our Southern competitors. Bessemer iron might be sold now at the furnace for $17 cash, and mill iron, which seems to enjoy quite a run, is selling closely up to $15. This should make the quotations for foundry iron approximately $16 and $17, but the market for that class of material is very dull, and no quotations can be obtained as resulting from actual sales, outside the swapping process daily indulged in by the Pittsburgh market. All in all, the situation is full of uncertainties, and the future is in the dark. It may be that the next thirty days will bring with them an improvement in the general feeling, which is most to be desired; for the iron market will not flourish under the impetus of a temporary boom, and without the manifestation of complete confidence by all the factors concerned.

DISTRIBUTION OF IRON ORE FROM LAKE ERIE PORTS.

One of the most interesting portions of the report of the Pennsylvania Canal Commission, favoring a ship canal from Pittsburgh to Lake Erie, is a statement, prepared from official sources by Mr. J. M. Goodwin, the engineer in charge, regarding the distribution of iron ore from Lake Erie ports. The figures are for 1889—the latest accessible at the time of preparing the report—and are therefore rather under than over the figures for 1890; but they no doubt present a fair average for recent years. Most of the data, we learn personally from Mr. Goodwin, are official, and the returns from furnaces include explicit statements from 38 companies, but, unfortunately, one or two railroads failed to furnish the desired figures. Without full returns it would be impossible to accurately analyze Mr. Goodwin's figures, but the details are so interesting and instructive that we venture to quote them exactly as they stand:

	Gross Tons.
Ore received at Ashtabula, O., in 1889	1,963,490

Ore shipped inland from Ashtabula, 1889:

	Tons.
By L. S & M. S. Ry. Co.'s lines	877,074
By Pennsylvania Co.'s lines	737,541
Total	1,614,615

The ore shipped by L. S. & M. S. Ry. Co. went:

To Nashua, N. H	13
To Worcester, Mass	58
To Titusville, Pa	206
To Scottdale, Pa	71
To Leetonia, O	5,042
To Mahoning Valley, O	159,488
To Shenango Valley, Pa	127,113
To Allegheny County, Pa	558,508
To Fayette County, Pa	14,510
To Kittanning, Pa	12,065
Total	877,074

The above specified distribution suggests that made by the "Pennsylvania" lines; but those lines took 229,483 tons of ore from Ashtabula to Johnstown, Pa.

The Pennsylvania Co.'s distribution was about as follows:

	Tons.
To Allegheny County	225,000
To Mahoning Valley	41,058
To Leetonia, O	35,000
To Shenango Valley	207,000
To Johnstown	229,483
	737,541

Ore received at Buffalo	298,060

This went (by rail mostly) to furnaces in Eastern Pennsylvania and New York.

49,852 tons went to Thomas Iron Co, via Lehigh Valley R. R. to Hokendauqua and Chain Dam.

Ore received at Cleveland, O, in 1889	1,742,415

Of this amount, 299,000 tons went direct to furnaces in Cleveland; leaving 1,443,415 tons to go inland. We have no details of the shipments of ore inland by the N. Y., P. & O. R. R., in 1889. The Annual Report of the directors of the "Erie" Railway, for the year ending September 30, 1889, contain no statistics of the ore traffic of the N. Y., P. & O. road.

The Pennsylvania Co. shipped inland from Cleveland, in 1889, 490,093 tons of ore.

We have account of receipts from Cleveland, in the year in question, by furnaces:

	Tons.
In the Shenango Valley	229,034
In the Mahoning Valley	255,068
In Allegheny County	253,812
In Leetonia	59,985
In Cambria Works (Johnstown)	16,871
In Elmira, N. Y	810
Total	815,580

But on the basis of actual shipments inland by the L. S. & M. S. Ry. Co., from Ashtabula, in 1889, *i. e.*, 84.34 per cent. of receipts, the aggregate shipments inland from Cleveland would have been 1,217,376 tons.

Ore received at Erie	391,204

Shipments by Philadelphia & Erie Ry. to furnaces and iron works in New Jersey and Delaware, and points in Central and Eastern Pennsylvania, 63,078 tons.

Shipments by E. & P. R. R. were 266,864 tons, of which we have account of, received at furnaces:

	Tons.
In Shenango Valley	57,675
In Mahoning Valley	1,343
At Johnstown	8,726
At Leetonia (about)	22,000
In Allegheny County	68,427
	158,171

The remainder (108,693 tons) probably went mostly to Allegheny County.

Ore received at Fairport	829,121

On basis of shipment inland, of 84.34 per cent. of receipts, the shipments inland would have been 699,280 tons. We have account of receipts of ore at furnaces from Fairport, in 1889, as under:

	Tons.
At Johnstown	49,236
In Allegheny County	304,409
In the Mahoning Valley	144,059
In the Shenango Valley	146,392
Total	644,096

Ore received at Lorain	299,252

This ore goes to Wheeling, and vicinity, via C., L. & W. R. R.

Ore received at Sandusky	186,082

On the Ashtabula basis, the shipments inland would have been 156,941 tons. We have account of receipts at furnaces in 1889, from Sandusky, as follows:

	Tons.
At Johnstown, Pa	4,497
At Pittsburgh, Pa	14,831
At Youngstown, O	1,502
	20,830

Exact disposition of remainder not ascertained.

Ore received at Toledo, 1889	87,033

This went to Hocking Valley furnaces, for the greater part, if not wholly.

Ore received at Tonawanda, N. Y	15,327

Tonawanda is on the Niagara River. The ore was used by the Tonawanda Iron & Steel Co.

Aggregate receipts of ore at Lake Erie ports, in 1889, in gross tons	5,811,984

From above aggregate of 5,811,984 tons, Mr. Goodwin deducts ore received at Buffalo, Toledo and Tonawanda; also ore shipped to Worcester, Nashua, Elmira, Titusville, Scottdale and Leetonia; also the 63,078 tons shipped eastward by the Philadelphia & Erie Railway, from Erie; also 299,000 tons destined for consumption at Cleveland; aggregate deduction, 1,184,935 tons, leaving balance destined for the Mahoning Valley, Shenango Valley, Pittsburgh and vicinity, Johnstown and Fayette county, 4,627,049 tons.

Thus, in 1889, an amount of ore equal to 79.6+ per cent. of the entire receipts of ore at Lake Erie ports, in that year (5,811,984 gross tons), was destined for points which, Mr. Goodwin argues, would be directly accessible by lake vessels upon the completion of the projected ship canal, from Lake Erie to the Upper Ohio, and of the Mahoning Valley "Lateral" connecting with the main canal near the point of confluence of the Mahoning and Shenango rivers.

If proportion of shipments inland, within the year 1889, was everywhere same as at the Lake Shore Railway docks at Ashtabula (*i. e.*: 84.34 per cent. of receipts by lake), the shipments inland, in 1889, to the Mahoning and Shenango valleys, Pittsburgh and vicinity, Johnstown and Fayette county, aggregated 3,902,453 gross tons. As this aggregate varies only a trifle from the amount of iron ore necessary to produce the entire make of pig iron officially credited to the districts above named, its substantial accuracy would seem to be assured.

BOILER EXPLOSIONS IN THE UNITED STATES IN 1890.

Well authenticated data concerning 226 boiler explosions occurring in 1890, are published by *The Locomotive*, the official organ of the Hartford Steam Boiler Inspection and Insurance Company. Of course, it is not pretended that these constituted all of the boiler explosions which took place in the United States during the year stated, but the investigations of the company into the causes producing the same are of much interest to steam users. Classified as to the kind of establishments in which they occurred, they appear as follows:

Saw-mills and other Wood-working Establishments	75
Locomotives	25
Steamships, Tugs, and other Steam Vessels	16
Portable Boilers, Hoisters, and Agricultural Engines	16
Mines, Oil Wells, Collieries	19
Paper Mills, Bleacheries, Digesters, etc	3
Rolling Mills and Iron Works	13
Distilleries, Breweries, Dye Works, Sugar Houses, and Rendering Works	3
Flour Mills and Grain Elevators	5
Textile Manufactories	1
Miscellaneous	50
Total	226

The total number of explosions reported by this company in 1889 was 180. The apparently large increase is owing, no doubt, to increased vigilance in inquiring as to the occurrence of such accidents, but the fact remains that there is an alarming degree of carelessness in the use of steam which calls for rigid treatment.

The total number of persons killed in the above explosions in 1890 was 244; the number of those injured was 351. Despite this appalling list of fatalities, it is gratifying at least to know that the number of those killed outright, or who died within a very short

time, as the result of explosion, was actually less than reported in 1889. The number of such in the years stated was as follows:

	1886.	1887.	1888.	1889.	1890.
Killed	254	264	331	304	244
Injured	314	388	505	433	351

But perhaps the most instructive summary presented is that showing the results of the 61,750 visits of inspection made by inspectors of the company to 118,098 boilers during 1890. We can do no better than reproduce the table for the study of manufacturers generally:

Nature of Defects.	Whole Number.	Dangerous.
Cases of deposit of sediment	7,250	378
Cases of incrustation and scale	12,113	436
Cases of internal grooving	711	105
Cases of internal corrosion	3 928	284
Cases of external corrosion	8,242	476
Defective braces and stays	1,462	423
Settings defective	3,132	298
Furnaces out of shape	4,347	164
Fractured plates	2,098	670
Burned plates	1,975	263
Blistered plates	3,209	148
Defective rivets	26,481	722
Defective heads	995	254
Leakage around tubes	23,246	2,493
Leakage at seams	4,863	361
Water gauges defective	3,087	411
Blow-out defective	1,074	243
Cases of deficiency of water	218	106
Safety-valves overloaded	535	159
Safety-valves defective	795	254
Pressure gauges defective	3,626	361
Boilers without pressure gauges	163	163
Unclassified defects	2 261	215
Total	115,821	9,387

Without going into an analysis of the table, we simply wish to call attention to the large proportion of defects arising from incrustation, defective rivets and leakage around tubes, and to remark that these investigations are deserving the serious attention of steam users, coming as they do from a company which, since its organization, has inspected 1,130,388 boilers, and ought to know what it is talking about.

A NEW SAW FOR CUTTING ARMOR PLATE.

A new cold saw for cutting steel armor plates is described by a Pittsburgh daily paper. It is in use in one of the largest plate mills and said to give results very much more satisfactory than the ordinary hot saw. It is decribed as simply a circular saw of fine steel, tempered somewhat hard and about one-quarter of an inch in thickness at the periphery. It is ground slightly thinner at its center to clear itself easily in a deep cut. It is made to revolve at a slow speed, while the old hot saw was run at a high rate and did its work by means of the intense friction created rather than teeth. It cuts but one inch a minute. The machine differs from the ordinary circular saw in this respect, that it is not the work that moves up to the saw, but the work is fixed stationary and the saw is made to travel along the table through it. It is driven by a worm-wheel and screw of some four or five feet in length, along which it can be moved easily by hand-screw gear or by self-acting feed gear. The saw runs in a tank of solution, and the greatest care is necessary in regard to the quality of the materials in this solution. It is made up of 10 pounds of whale oil soap, 15 pounds of sal soda, 2 gallons of best lard oil, with water added to make 40 gallons of mixture.

A MOVABLE MANUFACTURING SITUS.

Mr. Edward Atkinson's prediction, recently quoted in these columns, that the future situs of the world's iron production would be within sight of the Great Smoky Mountains of the South Appalachian chain, does not, it appears, go unchallenged. Mr. John Birkinbine, widely known as an iron expert, referring to Mr. Atkinson's assertion said, in a recent address before the Franklin Institute, of Philadelphia: "I do not agree with this theory, for if it is true, the ores of the Eastern and Middle States must have reached their maximum. The iron industries of Pennsylvania are here to stay, the ores of New York and of the Lake Superior region will continue to be in greater demand. The South and West will add to their industries iron production, and manufactures will extend beyond the continental divide and follow the tide of population rather than congregate in a limited area of mineral development." As the center of population is moving northward and westward, it will be interesting to see how Mr. Atkinson will reconcile the two theories.

WE are not advised at this writing as to the fate of the pig iron warrants bill, which has been pending for some time past in the House of Commons, but it was to have come up for passage on Friday, the 6th inst., and the latest advices were to the effect that it was certain to receive a large majority of votes. Its object is to do away with the evils of gambling in pig iron warrants, and has had the support, not only of the leading members of the iron trade of Great Britain, but also of the Attorney-General; Sir R. Webster.

PURE ALUMINUM MANUFACTURE.

About two weeks ago a suit was began against the Cowles Electric Smelting & Aluminum Co, by the Pittsburgh Reduction Co., of Pittsburgh, in the United States Circuit Court, and the Pittsburgh Reduction Co. moved for a preliminary injunction to stop the Cowles Co. from manufacturing pure aluminum at its works in Lockport, N. Y., under what the Pittsburgh Co. alleges is the Hall process covered by letters patent, owned and controlled by itself.

A large number of affidavits filed by the Pittsburgh Co. in support of its motion. Alfred E. Hunt makes affidavit that he is the president of the Pittsburgh Reduction Co. and has been since 1876 a civil and metallurgical engineer and chemist. For some years he has made pure aluminum a special study, realizing that in due time if its manufacture could be made more inexpensive it would be an important article of commerce in the mechanical arts. It was not until 1888 that he heard of the Hall process of reducing aluminum electrolytically from a fused bath of fluorides containing alumina in solution. The patented process was secured and the Pittsburgh Reduction Co. organized. It was successful and in due time was enabled to establish works in Pittsburgh and in Great Britain and to manufacture and sell pure aluminum at $1.50 and $2 a pound, where previously it had been sold as high as $12 a pound. Until January, 1891, the Pittsburgh Reduction Co. was the only manufacturer of aluminum in this country, though many concerns applied to it and were refused on the ground that the Pittsburgh Reduction Co. could supply all the demand and desired to retain the exclusive use of the Hall patent. In the Spring of 1890, no less a person than Eugene Cowles, of the Cowles' Smelting & Aluminum Co., notified Mr. Hunt that a concern in Boontown, N. J., was manufacturing pure aluminum by the Hall proccess and on this hint the New Jersey concern was investigated, owned up and desisted. The Cowles' people have made overtures to the Pittsburgh Reduction Co. to unite patents but have been refused, and last month began manufacturing pure aluminum in Lockport. Mr. Hunt declares that this was done to harass his company into a combination and thus secure to the Cowles Co. the value and use of the Hall process. The Cowles Co. has been offering pure aluminum at $1 25 and has even quoted it at $1. Prior to January the Cowles Co. has not pretended to make pure aluminum and has referred purchasers to the Pittsburgh Reduction Co. for it. Mr. Hunt says that the Cowles' process is an alloy process and not adapted to produce unalloyed metallic aluminum.

Among the other affidavits is that of Henry P. Moore, of Pittsburgh, who says that he worked as a laborer over night in the Cowles' works at Lockport, and who describes the manufacture that went on there. Moore describes the plant as being situated on an island in a swift and turbulent stream, guarded by watchmen night and day, with doors barred and windows painted within and without.—[Cleveland Plain Dealer.

Detection of Flaws in Metal.

An instrument for detecting flaws in metal castings and forgings, which is called the schiseophone, has been invented by Captain De Place, of Paris. The apparatus, says the London *Times*, consists of a small pneumatic tapper worked by the hand, and with which the piece of steel or iron to be tested is tapped all over. Connected with the tapper is a telephone, with a microphone interposed in the circuit. Two operators are required—one to apply the tapper, and the other to listen through the telephone to the sound produced. These operators are in separate apartments, so that the direct sounds of the taps may not disturb the listener, whose province it is to detect flaws. The two, however, are in electrical communication; so that the instant the listener hears a false sound, he can signal to his colleague to mark the metal at the point of the last tap. In practice, the listener sits with the telephone to his ear; and so long as the taps are normal, he does nothing. Directly a false sound—which is very distinct from the normal sound—is heard, he at once signals for the spot to be marked. By this means he is able not only to detect a flaw, but to localize it. Under the auspices of the Southeastern Railway Co., a demonstration of the schiseophone was given recently by Captain De Place, at the Charing Cross Hotel, in the presence of several members of the Ordnance Committee and other government officials. Some samples of steel, wrought iron, and cast iron, which had been specially prepared and privately marked, were tested, and in many cases the flaws therein were correctly localized by the instrument. On the other hand, some bars were broken at points where a flaw was indicated, but where the metal proved perfectly sound. Consequently, however ingenious the invention may be, it can hardly yet be called a practical success.

IT is hard to see how the reciprocity agreement with Brazil will help our makers of railroad machinery and supplies. Steel rails, locomotives of the American type, machine tools of all sorts, axles and car wheels are now made cheaper in Europe than in the United States, excepting only wood working tools and cast iron wheels. Ocean freights from Europe to Brazil are far less than they are from the United States, because there are always plenty of vessels in European ports seeking cargoes from Brazil, while between the United States and Brazil the conditions are exactly reversed. We have often known of New York contractors for railroad supplies and machine tools buying the material in England with which to fill their Brazilian orders, and it is not likely that a reduction of 25 per cent. in the Brazilian tariff would enable us to compete in that market even if we alone could hope to profit by that reduction to the exclusion of other countries. Those who have lived among and dealt with the Brazilians know them to be a people of shrewd and good judgment in business matters. The reciprocity agreement in itself is a sufficient evidence of the business shrewdness of the Brazilians who have negotiated it. It is not probable that they will forego any of the benefits of low prices in Europe or give up the trade which helps develop their own shipping interests for any sentimental considerations.—[Railway Gazette.

THE ENGLISH PIG IRON WARRANTS BILL.

We note that this bill is down for second reading in the House of Commons on March 6, and also that the subject is to be considered at the annual meeting of the Associated Chambers of Commerce to be held in London on March 3, 4 and 5 next, the Barrow-in Furness Chamber of Commerce having put upon the programme of resolutions to be discussed the following motion: "That this association approves the bill introduced into Parliament by Mr. W. G. Ainslie, M. P., with regard to dealing in pig iron warrants, and will use every endeavor to support the same whenever it is before the House." The bill before the House of Commons is undoubtedly a most desirable one; everybody, and especially legitimate traders, would like to have a stop put to the undue speculative operations that do so much, in periods of great activity, to disorganize business—and, in fact, very often even stifle an improvement before those naturally engaged in the trade can derive any benefit from it. Their action causes prices to go up with such rapidity and to such an extent that actual consumers, being unable to pay the rates demanded, are stalled off, and producers themselves, when there is a rapid collapse, as there almost invariably is after a speculative "burst," are left with contracts for materials which they have entered into at high prices, while they cannot keep up the value of the articles they have to sell in anything like the same proportion. This was markedly the case after the spurt which took place in the pig iron trade towards the close of 1889, many consumers of coke being saddled with lengthy contracts for their supplies at prices much out of proportion with the figures they could get for their pigs. And there is another unsatisfactory feature in connection with the operations of these gamblers—it is that if the market turns against them they have not the money to carry out their contracts, and where they have bought from a producer the iron is thrown on the latter's hands, to be sold at a very much less price, probably, than the maker had arranged to realize. Nevertheless, bad as gambling in the pig iron trade has been at times, it is by no means so extensively carried on as it is in some other industries—*e. g.*, in the cotton, woolen, sugar, and wheat trades. How often have we heard of the cotton "corners," which have caused actual paralysis of business, and manufacturers have had to combine and stop their mills two or three days per week in order to counteract the evil influences of the operations of those who had neither part nor parcel in the industry. The iron trade has never suffered to that extent, and if the Legislature interferes with speculative business in that industry, it cannot well stop at that, but should put a bar to such operations in all other trades, and prevent such transactions also on the Stock Exchange, where they are common enough. It is argued that gambling in the iron trade does not so severely press upon the public at large as gambling in wheat or cotton; it does not affect the necessaries of life, as it were, and therefore Parliament should single out some other industry with which to commence operations in this line. No doubt the Legislature, if they find they can devise an effectual barrier to pure speculation in iron, will not stop at that, but will go on to prevent it in other industries, though we fear it will be a task beyond their power to abolish it in the iron trade. They have tried their hand at preventing gambling in bank shares by the enactment of Leeman's Act, but with very indifferent success, as it is said that it is an easy matter to evade its provisions.

It is also a question whether it is wise to bring about State interference in private commercial transactions, and the fear is that in endeavoring to put down gambling we may seriously interfere also with legitimate trading. If that could be avoided, then no one would regret if the pure gambler were compelled to turn his attention to other articles as vehicles for enabling him to get rich rapidly and without labor or trouble. There must, of course, be a certain amount of speculation in carrying on all trades, but generally those so speculating are practically connected with the industry. Such ought not to be interfered with when they enter into *bona fide* transactions, but the Bill is meant to reach mainly those speculators entirely outside the trade, who recklessly buy and sell, never expecting and never desiring to really possess a ton of iron—it is simply a question of differences with them, and they do not care twopence if the trade "went to the dogs" to-morrow; they would simply turn their attention and their cash (if they had any—and more often than not they have none) to some other articles as a counter for their operations. When the Bill was first introduced into the House of Commons we remarked that, as then drawn up, it was scarcely stringent enough to bring about the results desired, whereas, if it is made more drastic it must affect legitimate business most injuriously, for it will probably prevent people buying for forward delivery, because that is simply speculating on the future—a privilege, or rather right, which every grocer, baker, or other tradesman is allowed to have, and the exercise of which determines the shrewd and successful man of business. It will be a matter of the greatest difficulty to scotch the gambler without hurting those legitimately occupied in the trade. But the Bill before the House is practically the same as was submitted and withdrawn last session owing to lack of time to consider it, and those intimately connected with the trade assert that it will be quite easy to evade it if it is not considerably altered from its present form. It may prevent dealings in warrants as such, for it is to invalidate all contracts for the sale or transfer, "unless such contract, agreement, or token shall specify, or incorporate a document of title specifying the name and address of the storekeeper or other person or persons by whom such document was created, the number by which the said document or title is distinguished at the time of making such contract, agreement, or token, the date on which such document of title was made, and the brand or quality of the pig iron to which such document of title is applicable." But instead of selling or buying so many tons of warrants, the negotiators of such a transaction would simply buy and sell so many tons of iron for delivery at or over a certain period. It is not necessary to have warrants to be able to carry on extensive gambling operations, or even to have large stocks, for far more gambling goes on, as we have said, in some other industries where there are no public stores, and the speculator in iron would by the bill be put in the same category as he who directed his attention to cotton, wheat, etc.

Thus Mr. Ainslie's measure, while probably checking gambling in warrants themselves, would not diminish reckless gambling in iron, and if the bill were made so that it would do this, it would be going too far, in that it would be liable to affect perfectly legitimate business. It would then make it illegal to enter into such a transaction as this: A person believes that prices will advance over a certain period, and accordingly buys now for delivery over that period, the iron he buys not being in existence now, and perhaps not for months after. In this he is doing no more than a tradesman who contracts for the supply of his goods for months ahead. What is required is not to put a stop to such business as that, but to abolish such transactions as gambling for differences, which transactions are by no means peculiar to the iron trade—they are far more rampant on the Stock Exchange; indeed, as we all know, they are every-day occurrence. Now, already, the Legislature does not recognize this speculating for differences as legal, if the two principals gamble direct, and such debts are not recoverable at law, because such business is only a "time bargain," and no cognizance is taken of this in the courts. However, it is curious to note that if the business is carried on by the aid of a broker or brokers such debts are recoverable. This has been decided not only in respect to iron speculations, but also frequently to gambling on horse races. We are all aware that it is illegal to bet, and a bet made direct is null and void, but when effected through the intervention of a bookmaker is apparently regarded as a legitimate transaction. Knowing that the same rule applies, gamblers in warrants for this and other reasons mostly take care that they do their business through brokers, and the law only gets hold of them if they cannot pay up their differences when the market goes against them, and they have to appeal to the Bankruptcy Court. Then the gambler may be severely dealt with, but not otherwise. Will Mr. Ainslie's bill be any more successful than have been the laws against betting on horse races, etc? It is to be feared that it will not, unless considerably altered, for we may trust the unscrupulous gambler to easily find out a way to evade the law. It is difficult to see how the law could prevent them selling to each other so much iron instead of so many warrants. One might never intend to deliver the iron or the other to take it, but if the law could step in, the buyer would readily say that he intended to take the iron, and the seller that he purposed to supply it. Everyone will look with the greatest amount of interest upon the House of Commons debate of the 6th prox, when our legistators in their wisdom may be able to devise some means of making the measure an effectual one without unduly interfering with the legitimate trade, though judging from the non-success of past efforts in this line, it must be confessed it is difficult to see how they are to do it.—[Colliery Guardian, London.

The Protection of Puddlers from Furnace Heat.

At the Menden and Schwerte Iron Works, in Westphalia, a method has been adopted for protecting the workmen at the puddling and heating furnaces from the heat radiated from the interior and the casing plates. It consists of a rectangular iron screen, hanging from an overhead rail, which can be made to cover the working side of the furnace, or can be pushed aside when not required. The lower end is bent over into a gutter, which has a slight fall in the direction of its length, and the upper end is provided on the inside, that nearest the furnace, with a pipe bored through with small holes about ¾ inch apart, which is in connection with the service pipe supplying water for cooling sides of the bed. When in use the inside of the plate is kept constantly wet from the supply pipe, the small jets trickling down to the gutter at the bottom, and running away to the cooling bosh at the side. A notch at the bottom is left for the passage of the rabble, and a short inclined plate is provided for the cinder to run over; but with these exceptions, the whole surface is screened by the water-cooled plate. At the time of balling up, the water is shut off, and the screen is run to one side, when the furnace is accessible in the ordinary way. This arrangement, which was first applied experimentally to a few furnaces, has worked so satisfactorily that it has been fitted to the whole of the puddling furnaces in the works, as it is found that the puddlers, being protected in great part from the exhaustive effect of the heat, can work full time, even in the hottest Summer weather. A sketch of a similar application to the doors of heating and open-hearth furnaces is also given by the author.—[Stahl und Eisen.

A Daring Project.

One of the features of the coming electrical exhibition at Frankfort-on-the-Main will be the transmission of power on a scale hitherto never attempted. When it was announced some months ago that it was proposed to transmit 100 h. p. from Laufen-on-the-Neckar to Frankfort, a distance of more than 100 miles, the statement was received with smiles of incredulity, but now it seems quite probable that not only will the experiment be tried, but that it will succeed in spite of the engineering difficulties that have to be surmounted. The government has been asked to supply line for the purpose, and on the system used the expense will not necessarily be at all severe, for the use of very high potential alternating currents is the feature of the scheme as at present planned. The alternating generator will supply a step-up transformer, that in turn will transmit its secondary current at an enormously high potential along the line, to be retransformed by a step-down transformer at Frankfort to a potential practicable for an alternating motor. A series of experiments carried out recently at Oerlikon involve the use of pressures as high as 33,000 volts on the line. At such a potential the current transmitted becomes so small that the line is a relatively small factor in the losses incurred, even though it be of the extreme length proposed. Nothing can better illustrate the characteristic advantages of the alternating system than this beautiful process of generating and utilizing currents at a moderate potential, and transmitting them from station to station at a pressure so enormous that the losses in transitu become insignificant.—[Electrical World.

LAKE SUPERIOR MINING NOTES.

MARQUETTE RANGE.

The new shaft of the Lake Superior Iron Co. that has lately been finished near Lake Angeline, and which is the most easterly on the line of their hematite run, will probably have considerable to keep it in a state of activity. They are drifting to the east from the 444 foot level, and a small stock pile of ore appears on surface. The ore here is of Bessemer grade, giving better than 62 per cent. in metallic iron, and shows about .030 in phosphorus.—[Iron Ore, Ishpeming.

A depth of 178 feet has been attained, at Section 21, says *Iron Ore*, and many ore lenses found, the latter occuring in small bunches or pockets. The mine evidently lacks sufficient depth to give a large and continuous deposit, and it is quite certain that a good mine could be had were the owners to sink for it.

Work has been resumed at the east end of the Lake Angeline property, where it was discontinued last Fall, but the force is not as large as at that time. This portion of the company's possessions is really a prospect as yet. The remarkable purity of the ore is what decided them to resume, as ore of that grade is bound to sell, no matter how depressed the market may be.—[Iron Ore.

A new mining company has been organized in this city, to be known as the Herald Mining Co. It is the intention of the company to operate on land described as the northwest ¼ of the northeast ¼ of section 33 in town 47 north of range 26 west, and situate two miles south of the Palmer mine. A shaft has already been sunk on the property to a depth of 30 feet, at which depth ore of excellent quality has been encountered, samples of which show it to be of Bessemer grade, very low in phosphorus and carrying 59 45 per cent. in iron. The indications are very encouraging, and it is expected the ore will improve in quality as further depth is attained.—[Negaunee (Mich.) Iron Herald.

The work of sinking the shaft at the Barasa is already well in hand and is being pushed by night and day shifts. A body of 62 per cent. ore has been located at a depth of 160 feet from the surface and unless unexpected obstacles arise, it will be reached by the first of June. The shaft is wet and some trouble is expected on account of sand, though with the new and powerful machinery, the difficulties should be successfully overcome. The managers expect to place the mine among the heavy shippers before the close of the current year. —[Marquette Mining Journal.

MENOMINEE RANGE.

An Iron Mountain (Mich) dispatch says: Much excitement prevails over the discovery of two of the most important iron ore beds that has been made since the finding of the Pewabic mine. The finds referred to are on what is known as the Kelly property, where a shaft has been sunk 104 feet, and is bottomed in an excellent quality of soft blue Besssemer ore, assaying 62 per cent. in metallic iron. The other find is a magnetic one by Dr. Crowell, who has sunk a drill hole 400 feet, just south of the Quinnesec mine, and has pierced 34 feet of magnetic ore. The Kelly property is a mile square adjoining the old Quinnesec mine on the west. This has both soft ore and magnetic veins and gives promise of developing into one of the largest and most valuable mines in this section. The shaft is two miles east of Iron Mountain.

At present, work at the Lee Peck mine is being carried on at a depth of 65 feet, though the shaft is 20 feet lower. The formation has a trend Northwest and Southeast, the exploitation being to the Southeast of the shaft where drifts and cross-cuts have shown a clean body of ore 40 feet in width. The ore is of a soft nature, bluish color and a non Bessemer in character, though running above 60 per cent. in metallic iron.—[Diamond Drill, Crystal Falls.

Capt. Thos. McCusker, E. S. Smith and Byron Weller, who have spent some time exploring on the northwest quarter of the northwest quarter of section 18, 42 33 adjoining the Night Hawk property and distant 80 rods from the Mastodon mine, have succeeded in unearthing what promises a mine. Nine pits having an average depth of 25 feet, have bottomed in ore of excellent quality, assaying 61 45 per cent. metallic iron. Some cross-cutting has been done which shows the vein to have good width.—[Florence Mining News.

The new find of ore on the Commonwealth Mining Co's. property, this city, is creating lots of enthusiasm in this city and Commonwealth, there being most excellent prospects of its developing into a big and valuable mine. The new exploration lies in an old cedar swamp, about one-third of a mile southeast of the Davidson pit. Three or four test pits were made in the locality several years ago, and some very good looking stuff was taken out, but in consequence of the great abundance of water encountered, further exploratory work was abandoned at that time. It was determined to give the property a more thorough examination. The first pit put down struck ore at just about 14 feet from the surface, and from the first day of discovery up to the present time sinking has steadily progressed through clean ore. The pit, now transformed into a fine exploratory shaft, has reached a depth of 38 feet, the last 24 feet of which is in a most excellent grade of ore, bluish in color and soft and greasy in character. The ore assays from 63 to 67 per cent. in metallic iron, and search for phosphorus so far shows the presence of about .010 per cent. of that ingredient. The quality of the ore is, therefore, much superior, to that yielded by any other mine in this vicinity. A new test pit put down 100 feet southeast of the shaft is also bottomed in ore at a depth of 15 feet. A second shaft is now being sunk 200 feet, nearly south of the first one started (No. 1), and there is little doubt that ore will be struck at that point.—[Florence Mining News.

A review of mine operations in this district predicts anything but a dull season after the opening of navigation. All of the mines, with the exception of three, have put in a very active Winter doing preparatory work and getting in the best possible condition for an active and busy Summer. In developmental work stockpiles of various weights ranging from 5,000 to 25,000 tons have accumulated. The Chicago & Northwestern Railway Co. had three switch or train crews employed here last year, which, the writer learns, will be increased to five crews during the Summer. Taking everything into consideration the outlook of the great Crystal Falls district is anything but discouraging.—[Diamond Drill, Crystal Falls.

Water Power of Lake Superior.

Colonel Hope, of London, has, says the *Canadian Manufacturer*, organized a company for utilizing the enormous water power of Lake Superior and constructing very extensive works in the vicinity of Sault Ste. Marie. The waters of Lake Superior fall at the Sault about 30 feet to the level of Lake Huron, and the velocity has been recorded by General Powell, of the United States service, as a little more than 90,000 cubic feet a second. Colonel Hope, who has just returned from spending several weeks on the spot, made careful and accurate measurements and calculations, and finds the actual velocity and volume of water to be 122,000 feet per second, equivalent to 236,000 horse power. His company intend to build a tail-race five miles long on the Canadian side, and a canal five miles long on the American side. These canals will be each 1,000 feet wide, the widest in the world. They will construct large dry docks on both sides, to be filled and emptied by gravitation. They will be the only dry docks in the world, so far as Colonel Hope knows, filled and emptied by this method. On the Canadian side all the principal works will be above the rapids, and on the American side below the rapids. The reason of this is that the land for factories and mills is furnished on the Canadian side above and on the American side below the rapids. There will blast furnaces and ship yards, and it is expected that there will be paper mills, pulp mills, flour mills and other industries, whose motive power will be supplied by this company or by one of the several subsidiary companies, which it is the intention of Colonel Hope's company to form.

Structural Iron.

The increase in the use of structural iron in the Northwest is one of the most interesting points in the marvelous development of the section, and is by no means confined to the two or three cities therein which lay claim to metropolitan distinction. In nearly all public buildings and in private enterprises of the more permanent and substantial character, whether they are in towns of a hundred thousand or two thousand inhabitants, more or less architectural iron work is used, and experienced builders say the proportion consumed is quite as heavy in the Northwest, according to population, as it is in the East. When it is considered that the cities and towns of the Northwest have all been built in a hurry and supposedly with less regard for permanence than the necessity for expedition, the true importance of the fact is plain. As an industry the manufacture of architectural iron ought to grow very rapidly and keep pace fully with the development of the iron resources of the country. —[Northwestern Mechanic.

Cost of Aluminum.

Mr. A. E. Hunt, of the Pittsburgh Reduction Co., in a paper read before the Society of Arts of the Massachusetts Institute of Technology, in Boston, made the following statement of the probable cost of producing aluminum upon a large scale:

2 pounds alumina (Al_2O containing 52.94 per cent. Al_2) at 3 cents	$0.06
1 pound of carbon electrode at 2 cents	.02
Chemicals, carbon dust, and pots	.01
22 electrical horse-powers exerted 1 hour (water power being used)	.05
Labor and superintendence	.03
General expense, interest and repairs	.03
Total cost of 1 pound of aluminum	$0.20

Of course, the cost of aluminum at the works of the Pittsburgh Reduction Co., which have a capacity of but 375 pounds per day, is much greater than this. The estimate is of considerable value, however, as showing to what point the cost of producing aluminum may be reduced under present conditions.

How to Make Strong Castings.

Some of the English iron founders have adopted a simple practice in making stronger castings. The method is merely the introduction of thin sheets of wrought iron in the centre of the mold before casting. This idea was first applied to the casting of thin plates for the ovens of cooking stoves, and a sheet of thin iron in the centre of a ¼-inch oven plate renders it practically unbreakable by fire. Recently the process has been applied to the casting of large iron pipes, a core of sheet iron imparting additional strength and lessening the liability to fracture. As an evidence of an additional strength that may be imparted by this process it is stated that a plate of iron, one-fourth of an inch thick, cast with a perforated sheet of 27 wire-gauge wrought iron in the centre, possesses six times the strength of a similar cast plate with no core. The ¼-inch plate thus made has the strength of a plate one inch thick. —[Boston Commercial Bulletin.

Atlantic-Pacific Tunnel Finances.

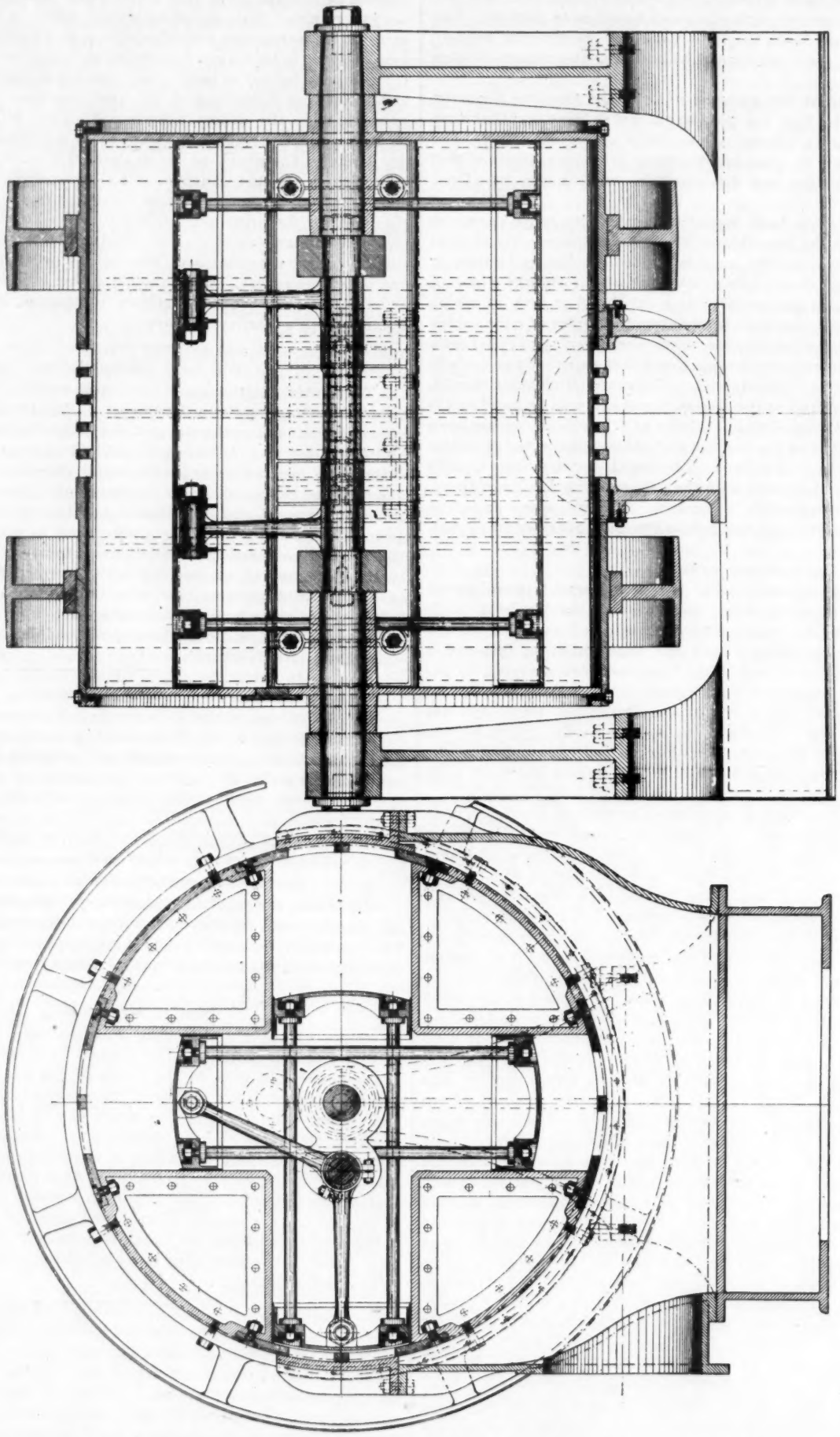
The Atlantic-Pacific Tunnel Co., we are informed, "has fully paid for all of its properties, outside of the mountain, or in, and thus far reached, and all of its properties indoors or out. All of its interest obligations as thus far matured have been promptly met. All bills for labor and supplies, needed or furnished in any way or place for the Tunnel Co. to date of March 1st, are paid in full. All bills for advertising, insurance, and all taxes on its properties are paid, so that it enters the present fiscal year, dating from March 1st., entirely free from floating debt except as now accruing, dating from March 1st. They are carrying on work at both ends of the tunnel day and night, their line of procedure being to pay as they go, and go as they pay."

THE ten largest cities in the world are: London, Paris, New York, Canton, Berlin, Vienna, Tokio, Chicago, Philadelphia, St. Petersburg, in the order mentioned.

A NEW FORM OF BLOWER.

We illustrate below (from a cut kindly furnished by the *American Manufacturer*) a new form of blowing machine, one designed to fill a gap between the ordinary rotary blower and a blowing engine, and constructed to blow a positive volume of air at from 2 to 8 pounds pressure, to meet the wants of improved mining and melting operations, requiring more pressure than the present rotary blowers produce.

The blower is of the piston type, consisting of four rectangular chambers and pistons, placed at quarters within a cylinder or drum, the walls of this cylinder or drum forming the heads of the chambers. The large cylinder, containing the four small chambers, revolves around a stationary axle. Outside of this cylinder, and extending above the center on each side, is the wind box, into which each of the small chambers discharges as they pass through. The crank pin is also stationary. Two of the pistons are connected direct to the crank with two connecting rods each. The two pistons opposite to those connected to crank, are connected by hollow rods to the first. When one of the chambers is passing over the upper half of the circle, its end is free to the air, which, as the piston recedes, fills the one chamber through the slots or openings. The piston to the left has discharged the contents of that chamber, and the one to the right is full and ready to discharge as soon as the cylinder has moved far enough to bring the openings in end of cylinder within the wind box; here there is lap sufficient to allow the piston to compress the air within the chambers before it is discharged in the wind box. The lower chamber is wide open in the wind box; it moves up to the left, the piston nears the end and all the air is expelled. The motion of the pistons back and forward is accomplished by causing them to revolve around the stationary crank pin, to which they are attached direct and indirect. The wind box is only wide enough to cover the ports in end of chambers, it is bored out to fit circle of cylinder, and has a packing space to prevent leakage along the sides.



NEW FORM OF BLOWER. LONGITUDINAL VERTICAL SECTION.

CROSS-SECTION.

The pistons are cast iron, made as light as possible, and have their sides faced with leather, chamfered on ends to insure tight fit.

Of the material used in construction of these blowers, all the rods and pins are of steel, with bronze bushings; the different pins are held tight and in place by being made taper under heads and split taper sleeves with the nut. The whole machine is mounted on one base and is self-contained. The drawing shows one run with two belts, but they are also made to run with gear, with a small engine placed on same base. Sizes run from 4 to 80 cubic feet displacement per revolution. The blast is steady and can be used for any purpose. Mr. P. L. Weimer, President of the Weimer Machine Works Co., at Leb-

anon, Pa., is the patentee. The blower is covered by letters patent No. 345,751, bearing the date July 20, 1886, and is manufactured by the above firm. For further particulars address the patentee.

PETROLEUM AS FUEL.

Several years ago, says the New York correspondent of the Pittsburgh *Dispatch*, considerable interest was taken in naval and mercantile circles in the question of the substitution of petroleum for coal in the furnaces of ships' boilers. Experiments were made in this direction, and a few injectors, for using the oil, were patented at Washington.

The late Charles Marvin, in his book, "The Region of the Eternal Fires," drew public attention to the enormous development of the Russian petroleum industry, in the neighborhood of the Caspian Sea. He described the various oil deposits of the world, and gave an account of the giant gushers in the Baku district, of the Caucasus, which spout sometimes as many as 11,000 tons a day. But Mr. Marvin's lectures and writings referred principally to the military and political bearings of the oil trade.

In April, 1886, the commercial side of the problem, and also the question of its application to our war ships, was brought before the Navy Department by the statement of a prominent officer and traveler, that there was not a single steamer on the Caspian, or a single locomotive running upon the lines connecting the Caspian with the Russian territory to the north, that used anything except oil as fuel.

The question was taken up at the same time by the British service. Petroleum in England at that time, however, was 100 per cent. dearer than coal, and, although an oil-burning apparatus was fitted to a large steamer named the Himalaya, the expense involved prevented any very general development of the idea by private ship-owners.

A fatal blow was given to the matter in the British service, at that time, by the Earl of Ravensworth, who was convinced that petroleum was unfit for use on war ships "because the idea of a shell alighting in an oil tank is only second in horror to the notion of a large charge of dynamite beneath the hull of a ship." Not long before his lordship's speech there had been a terrible explosion on board an oil ship, whereby all on board perished, and no doubt this event influenced his opinion on the subject.

In the meantime the use of a liquid fuel has made very great strides in America, where many hundred factories, furnaces, locomotives and steamers are now fitted with appliances to burn oil instead of coal. This has been brought about by the discovery, through improved systems of boring, of copious deposits of petroleum, so that at present there are over 2,600 oil wells in the United States. According to a scientific report, published in 1888, by the Canadian Government, the largest petroleum fields in the world have been discovered in the Athabasca region. In Burmah, immense deposits of petroleum have also been discovered. In Persia there are large deposits within easy reach of the sea.

As far as the question of supply is concerned, oil is to be found in nearly every quarter of the globe, so that on many stations it could be delivered to our men-of-war more cheaply than coal. Scotland still produces annually 7,000,000 gallons of paraffine, so that the British navy has independent supplies near its dockyard depots. Taking all these facts into consideration, it is rather strange that this Government and the British Government have done so little to develop the use of liquid fuel in the navy.

A recent address of Nelson Boyd, to the Civil and Mechanical Engineers' Society, has again drawn considerable attention to the probability that petroleum will be the fuel of the future for marine and underground locomotive purposes. The Russian Government has for several years used this form of fuel, and it is being adopted in some of the vessels of the Black Sea fleet. The advantage of liquid fuel for generating steam in marine boilers is very great, and it is asserted that very little alteration in the present form of furnace is necessary.

The cost would therefore be small, and the fittings would be movable, so that if required, coal could be burned as at present. A great reduction in weight and bulk of fuel is thus gained, amounting to between 30 and 40 per cent. The labor of trimming the coal in the ship bunkers would be saved, and as simply attending to a few regulating valves for the oil burners is much easier work than shoveling coal into a furnace, a reduction of three-fourths the number of stokers now employed could be looked for.

The fires could be promptly kindled and extinguished; the supply of steam would be under easier control, and consequently be more regular than when burning coal; the necessity for forced draught would be done away with; there would be freedom from smoke, and an absence of dirt and ashes, if not of offensive gases. The saving of time and labor in coaling ships would be great, not to mention the wear and tear of the inside of the coal bunkers and the coaling appliances. The liquid would be run into the ships' tanks from high level cisterns, and might be made to take the place of water ballast in a merchant steamer, or be run into the double bottoms of a war vessel.

Mr. Boyd has pointed out that there can be no general use of oil, by the navy, until stations have been established where coal stations have been formerly necessary. This would involve a very great expenditure, but there is reason to believe that the cost would be undertaken by private enterprise, at places selected by the Government, if there were any probability of the use of oil on a large scale. Much may, therefore, depend on the result of a few very necessary and cheap experiments with apparatuses that would soon be designed by naval engineers, if sanctioned by the Naval Department.

In March, 1889, a very successful trial was made at Portsmouth, England, of a torpedo boat, in which liquid fuel was made for generating steam. In this case the oil was creosote, refuse from tar. The vessel had an ordinary locomotive boiler, which was fitted up with 21 burners playing into the furnace, each giving a flame six feet six inches long and nine inches in diameter. Exhaustive trials at progressive speeds were made, 13 knots being obtained with four jets of oil at 28 pounds air pressure, while over 21 knots were obtained with 21 burners at 30 pounds air pressure. The consumption of oil at this speed was considerably under 1,000 pounds per hour, about half the weight of coal needed to attain the same results.

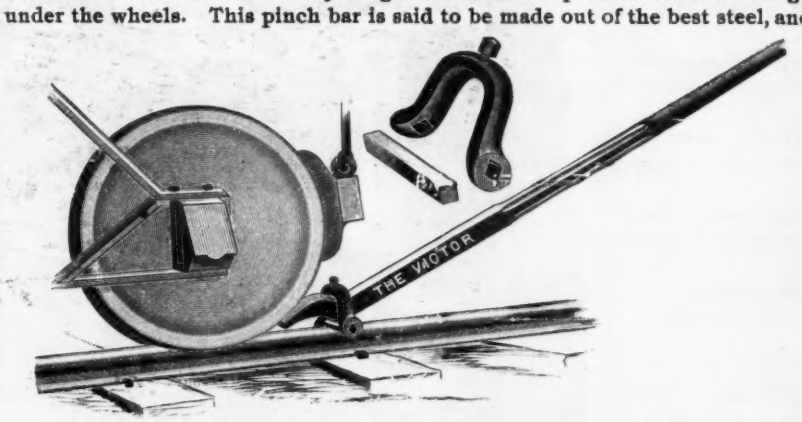
Creosote and other oils have also been successfully burned in the furnaces of land boilers. The experiments of the railway companies, however, in using this fuel, although in some cases carried out at considerable expense, have not resulted in its being adopted to any great extent.

With reference to the dangers which the British officer feared so much, it is not thought that they would be found to be very serious in the United States navy. Special precautions would have to be taken, as is now the case with coal bunkers on war ships, and it may be mentioned that with every precaution bunker explosions do sometimes occur. Proper provision would have to be made for the escape of the gases, which are given off more or less by every kind of liquid fuel.

The experience already gained shows that the engineering difficulty has been overcome. There can be no doubt that, when the time arrives that petroleum can be used economically, engineering skill will be able to design special arrangements which will enable petroleum or any other kind of liquid fuel to be carried and used with a degree of safety equal to that with which coal is used at the present day.

THE VICTOR PINCH BAR AND CAR MOVER.

The accompanying illustration represents the Victor pinch bar or car mover, and is manufactured by Thornburgh & Glessner, 110 and 112 S. Jefferson street, Chicago, Ill. It is claimed by all who have used this car mover, that it is far superior to any that has yet been put on the market. Mr. J. W. Ellis, Secretary of the Excelsior Starch Works, of Elkhart, Ind., says that no manufactory that has railroad cars to move can afford to be without one. It is said that a great many pinch bars have been put on the market, and that none have been effective for any length of time except that class which go under the wheels. This pinch bar is said to be made out of the best steel, and



another great feature that is claimed for it is that it has no joints and no lost motion; also that it will work under all brakes, and that its fulcrum, which can be taken out by loosening the set screw, has four corners, and its position can be changed on the bar in a moment. It also takes hold at a point on the wheel where it moves the car instead of lifting the wheel from the rail. Thornburgh & Glessner make a liberal offer in saying that the best way to be convinced of its value is to send for a bar for a trial for one week, and if it is not satisfactory to return it. For further particulars, price, etc., address the manufacturers as above.

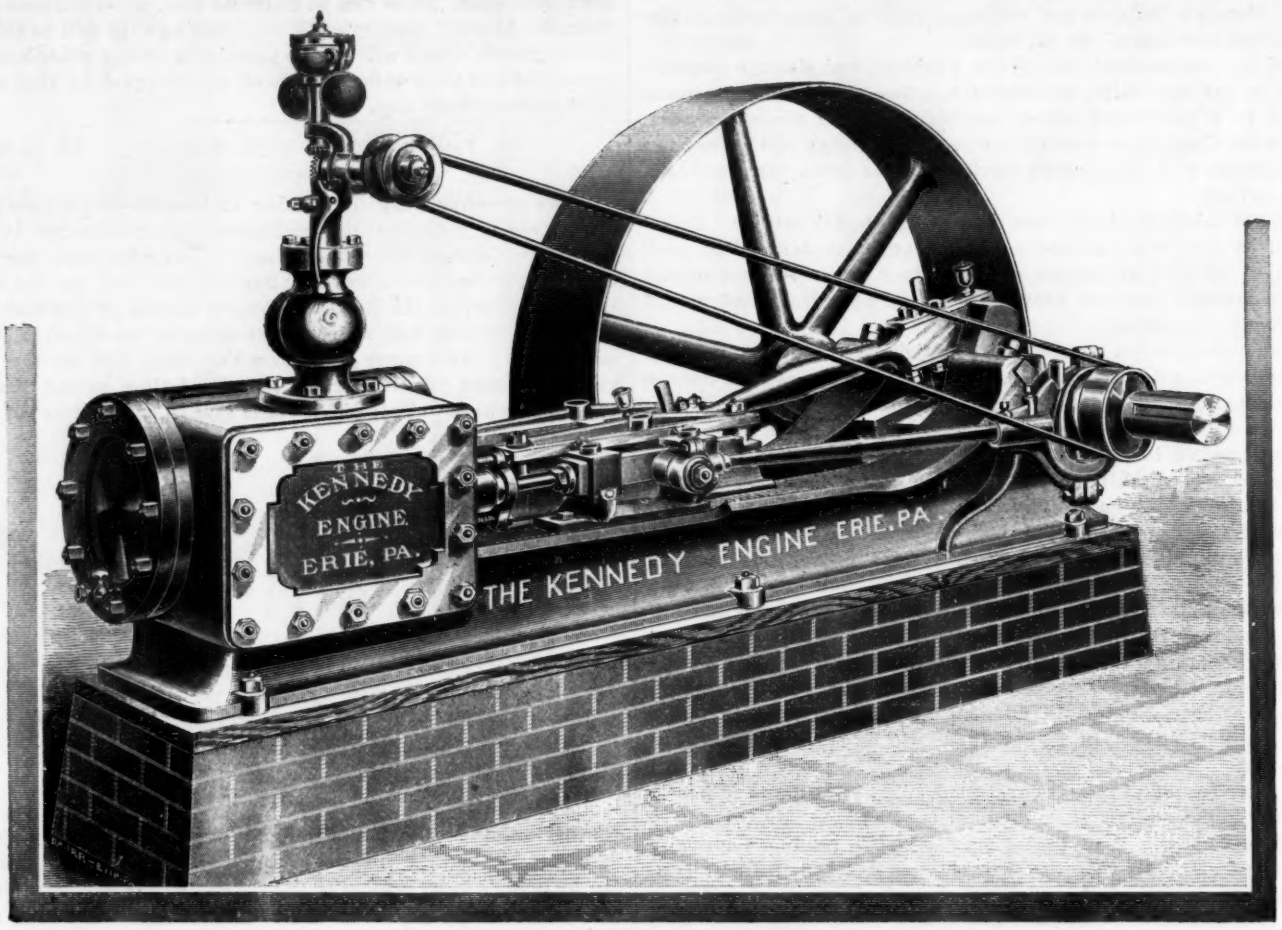
China Introducing the Blast Furnace and Rolling Mill.

One of the most progressive steps taken by the Chinese government in recent years is toward the establishment of extensive and complete iron and steel works upon the plans of English metallurgists. About a year ago two English engineers went to China to take charge of the work for the government, and the preliminary arrangements have been made. The site chosen for the works is on the northern slope of the Hanyang hills near the junction of the Han and Yangtze rivers, opposite the native city of Hankow, in the province of Hoo Pe. The soil is so marshy and so subject to inundations by the rivers that the site will be raised to about 50 feet above its present level and protected by massive embankments. The plant will include two large blast furnaces of the best English type, capable of producing about 100 tons of pig iron daily. There will also be a complete Bessemer steel plant, with two five-ton converters and all the necessary cupolas, casting cranes, blowing engines, etc. The product of this plant will be made chiefly into rails, and there will be a large rail mill with all its appliances for this purpose. It is officially stated that the manufacture of rails for future railroads is one of the chief objects of the Chinese government in building these works. There will be a small Simens-Martin open-hearth steel plant for the manufacture of ship-plates and mild steel for small fire-arms. There will be a very complete iron mill, including 20 puddling furnaces and a plate and bar mill. The works will cover about 40 acres, and will be traversed by numerous small railway tracks for the handling of materials and products within the works. The contract for the machinery for the entire plant was placed with an English house, and the specifications call for the delivery of all the material early in 1892. A large quantity of the machinery has already been shipped, and all of the blast furnace material is now on the site of the works.—[Labor Tribune.

WE are in receipt of a Spring catalogue of E. T. Barnum, 179 Jefferson Ave., Detroit, Mich., manufacturer of wire and iron goods of all description. This catalogue consists of 112 pages and cover full of cuts of every variety of articles that can be made from wire and iron. The reputation that Mr. Barnum has acquired in this line is world-wide and people in need of his line of goods cannot do better than purchase of him.

DETACHED CENTER CRANK ENGINE.

We present herewith an illustration of the Kennedy detached center crank engine, which is manufactured by the E. Walker Tool Co., 20 and 22 West Fourth street, Erie, Pa. This engine may be connectad to any style of boiler, and in many locations is preferred to the side crank, or more commonly called stationary engine, as they are more easily set up, requiring no extra foundation for out-end bearing. The cylinders are well secured on bed, the cylinder heads being secured with nine studs at front and back end. The steam chest cover is secured with 14 studs. The cranks are solid forgings, slotted out, having no welds, and they are all balanced. The engine complete includes pulleys, governor, with belt, throttle valve, and all necessary oil cups, but does not include any steam, water, or exhaust pipes or foundation bolts. All these engines are made with special tools, so that each part can be duplicated. Each engine is thoroughly tested under steam, and is guaranteed before leaving the works to be of the best material and workmanship. For further particulars address the manufacturers as above.



DETACHED CENTRE CRANK ENGINE.

ARMOR PLATE TRIALS IN ENGLAND.

A very interesting test of an armor plate took place last week on board the "Nettle," at Portsmouth. The plate was of the Wilson compound (steel-faced) system, and was manufactured at the Sheffield works of Cammell & Co., as part of the armor belt of a war ship now being constructed by Laird Brothers, at Birkenhead, for the Argentine Republic. The test was conducted by the British Admiralty officials, in the presence of officers of the Argentine Naval Commission, Captain Emory, United States Naval Attache, and Mr. Laird also being present. The plate was eight in. in thickness, and was cut to the usual "Nettle" size of eight ft. by six ft. For the purpose of comparison between this compound plate and similar armor of the Schneider (Creusot) make, the Argentine Commission required the test to be carried out on the same lines as are adopted by the French Government in their reception tests of armor at Gavres. The conditions of this test were three Palliser chilled projectiles weighing 100 lbs. each, fired from the new six-in. breech-loading gun, with 32 lbs. of E. X E powder, developing a striking velocity at the range of 30 ft. of 1,566 ft. per second, equal to an energy of 1,700 foot tons. or a total energy for the three rounds of 5,100 foot tons. The shots were grouped in the center of the plate at the three points of an equilateral triangle, the base of which was two and a-half times the calibre of the shot measured from center to center. The compound plate withstood this crucial test in the most perfect manner, breaking up into mere dust all three projectiles, which were hardly able to make any impression upon the hard steel face of the plate, the indentation in one instance being only 1.2 in., and in no case exceeding two in. A few fine hair cracks were developed in the steel face, but these were so fine as to be almost invisible, and none of them extended beyond the thickness of the hard steel surface. Although the plate is not yet taken down from the wooden backing, the damage done it is so slight that it may be safely assumed there will be absolutely no bulges in the rear of the impacts. This test becomes particularly interesting when it is compared with a solid steel plate of the Schneider manufacture which was tested on the 23rd of May, 1890, at the French Government polygon at Gavres, and was classed by the Government Commission as *tressatisfaisant*, the highest award of merit possible. This plate was one forming part of the belt of the Chilian cruiser "Captain Prat," measuring 18 ft. 4 in. by 6 ft. 9 in. by 8 1-16 in. thick, tapering to 5 5-16 in., which, under similar conditions, allowed the projectiles to penetrate nearly the full thickness of the plate, the plate itself being cracked through its entire thickness by the first shot. To sum up this comparison, the total energy per ton of armor plate for the English compound plate was 744 5 foot tons, while for the French all-steel plate it was only 304 foot tons. The English plate also possesses immense advantage over its French rival in its greater resistance to penetration, in the entire absence of through cracking, and in exhibiting the all-important characteristic of breaking up and destroying the projectiles on impact.—[Colliery Guardian.

Merit vs. First Cost

"When two brands of the same sort of goods are selling side by side in the market, one bringing double the price of the other, what is it that enables the former to find sale? Always because it is worth that much more; because it will wear longer, do better service while it lasts, keep one satisfied with his purchase, instead of kicking himself for a fool all the time he has it; be reliable at the sharpest emergency, instead of liable to give out just when it is needed most. And the concern dealing in such goods has to charge more for them, because it costs more to make them."

The above quotation is from *Harpers'* for February, and seems singularly appropriate of machinery and all mechanical devices used in great manufacturing establishments, where a single breakdown may cause a loss of many times the difference in first cost. Just coming in the scope of this matter is recalled the fact that 20 or 25 years ago, a certain firm began the manufacture of a steam boiler, which they determined should always be the very best known to the art, entirely regardless of first cost. Friends pooh-poohed them, saying people would never pay for real merit. Nothing deterred them, however. Sticking closely to the high standard they had adopted, they fought against all discouragement, the hard up-hill fight of the pioneer, losing money year after year, till finally, the tide turned. Merit won. To-day, in spite of their being the highest-priced house in the market, by their splendid showing, they stand head and shoulder above all competitors, doing last year, probably, as many dollars' worth of business as any other five makers of boilers in the world put together. Reference is made to the Babcock & Wilcox Co., of New York. Should one not learn from this the lesson, that, as manufacturers, one's fortune and great success will, in all probability, depend rather on the quality of product, than on a reputation of being the lowest bidder?

Largest Locomotives in the World.

Four of what are said to be the largest locomotives ever built in the world are nearing completion at the Baldwin Locomotive Works, at Philadelphia, Pa. They are being built for the Grand Trunk railroad, and will be used in the St. Clair tunnel, which runs under the bed of the St Clair river, between Port Huron, Mich., and Sarnia, Ont. There are five pairs of 50-inch driving wheels on each side of the boilers, and the cab is in the centre of the boiler, extending out over the two tanks. The locomotive is thus constructed to allow it to run equally well backward and forward. The cylinders are 22x28 inches, and the boiler 74 inches in diameter, with capacity to carry 160 pounds of steam pressure. Each locomotive, with the water tanks filled and the starting supply of coal on board, weighs 200,000 pounds, the average weight in running order, with tanks about half filled, being 180,000 pounds.

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INDUSTRIAL SUMMARY.

New Enterprises:—

A patent street car motor will be manufactured in Swansea, Mass., by Geo. J. Althan.

The National Wire & Iron Co., Cleveland, has been incorporated with a capital of $10,000.

Philpott & Leupple have broken ground at Niagara Falls, N. Y., for a machine shop 80x38 feet, two stories in height.

Charles F. Alverson has purchased the foundry and machine shop at Nunda, N. Y., and will commence operations next month.

Maj. McGregor, W. D. Fullerton and Marcus Hitch have incorporated the Columbia Car Coupler Co., at Chicago, with a capital stock of $300,000.

The Canton Bridge Co. have been incorporated at Canton, O., for the manufacture of iron, wooden or combination bridges. The incorporators are C. H. Barnard, G. L. Miller and J. R. Herring.

An iron foundry will soon be erected on Treat and Webster Island, Old Town, by parties from Bangor, Me. The contract has been completed and this industry will be added to the town in a short time.

The Norwood Car Replacer Co. is organizing a company with W. C. Codd, President, and H. C. Thomas, Secretary, for the purpose of erecting malleable iron works at Baltimore, Md. The capital stock is to be $100,000.

The New Monitor Co. has been incorporated at Chicago, with a capital stock of $50,000, to manufacture agricultural implements and to conduct a foundry and planing mill, by E. Listenwalter, C. M. Coates and P. E. Simmons.

The Zell Stored Power Co. have been incorporated at Baltimore, Md., with a capital stock of $500,000, to manufacture a motor invented by R. R. Zell. The incorporators of the company are Oden Bowie, I. F. Rasin, W. J. O'Brien and others.

C. W. Huntington, J. K. How, W. H. Pitcher, and others, have incorporated at Baltimore, Md., as Huntington, How & Pitcher, for the manufacture and sale of all kinds of electrical machinery and supplies, etc. The capital stock is $35,000.

The Alabama Locomotive Co. has been incorporated, with a capital stock of $1,000,000, for the purpose of establishing locomotive works at Alabama City, Ala. The charter of this company gives them the privilege of increasing the capital stock to $10,000,000.

The Galesburg Union Manufacturing Co., of Galesburg, Ill., with a capital stock of $100,000, has been incorporated, to carry on a foundry, a machine shop and planing mill; incorporators, Olof Hawkinson, Aaron Linnenott, N. M. Burgland and Nels Nelson.

The Day Railway Construction Co., of Chicago, has been incorporated, with an authorized capital stock of $10,000 000 to construct surface and elevated roads, rolling stock, motive power and appliances; incorporators, St. John V. Day, Edwin F. Getchell, and Willard T. Block.

The Minneapolis Fire-Arms Co., Minneapolis, Minn., have been organized with a capital of $150,000. The company will manufacture fire arms of all descriptions. The Board of Directors comprises George D. Emery, W. B. Palmer, E. M. Mabie, J. F. Calderwood and M. P. Hawkins.

A corporation to be known as the Staple Fastening Machine Co., capital stock $100 000, has been organized at Saco, Me., for the purpose of doing a general machinery business. The officers are: President, William S. Hamm, of Newton, Mass; Treasurer, J. Sidney Snow, of Boston, Mass.

The Keystone Manufacturing & Supply Co., of Pittsburgh, have made application for a charter for the purpose of engaging in the manufacture of iron, steel and other metals. Among the incorporators are Joseph W. Craig, Thomas H. Adams, Charles E. Dickson, Grant McCargo and Samuel M. Willock.

It is reported that the Brown Segmental Tube Wire Cannon Co. have secured an option on five acres of land, near Greensburgh, Pa., about 30 miles from Pittsburgh, for the erection of works to manufacture wire-wound cannon, which are said to be practically indestructible. If arrangements can be made a large plant will be erected.

Additions, Enlargements, Removals, etc.:—

It is announced that the Iowa Barb Wire Works will shortly erect an annex to their plant at Allentown, Pa. The addition will be 100x160 feet, of brick, and will be built to the west end of the barb mill, which will then be 100x300 feet, making it the largest establishment of its kind in the world.

The Harrisburg (Pa.) Car Manufacturing Co's. plant has been purchased by local capitalists, who will put it in operation.

The Chicago Foundry Supply Manufacturing Co., of Chicago, Ill., will construct a facing mill 300x70 feet, to cost $50,000.

The iron and steel shafting works of Merwin McKaig, of Cumberland, Md., it is stated, will be removed, to Martinsburg, W. Va.

Work on the new factory of the South Wareham (Mass.) Nail Works is being pushed rapidly forward. New machines are to be put in.

Messrs. Carnegie, Phipps & Co., of Upper Union Mills, Pittsburgh, Pa., are erecting a new building for the manufacture of girders, used in the construction of bridges.

The Walden Knife Co., Walden, N. Y., are building an addition to their present factory. This enlargement will permit a needed increase in the company's capacity.

The Wenstrom Consolidated Dynamo & Motor Co., of Baltimore, Md., contemplate issuing $25,000 in bonds for the purpose of establishing a plant for the manufacture of dynamos and motors.

The W. S. Tyler Wire Co., Cleveland, have just completed a building 265 feet long by 50 feet wide, and five stories in height, at a cost of $65,000. This addition to their works will give employment to 350 persons.

The Canonsburg Iron & Steel Co., of Canonsburg, Pa., has decided to enlarge its capacity. The firm manufactures sheet iron and steel for stamping purposes and galvanizing. The present capacity is about 4,000 tons per year.

The Hubbard & Haskell File Works, lately moved from Erie, Pa., to Painesville, O., has lately been changed into a corporation and christened the Grand River File Co., of Painesville, O. Mr. Hubbard has withdrawn his interest, and Mr. Geo. H Haskell is president and manager of the new company, while the secretary is Mr. John Langan, formerly with the Simmons Hardware Co., St. Louis.

Fires and Accidents:—

Fire recently damaged the plant of the Mechanics' Boiler Works, at Pottstown, Pa., to the extent of $3,500.

Schwab & Sercombe's foundry and machine shop, at Milwaukee, Wis., have been damaged by fire to the amount of $10,000. The loss is covered by insurance, and operations will not be seriously delayed.

General Industrial Notes:—

Lampson-Session Nut & Bolt Co., Cleveland, are running to their full capacity and are employing 400 hands.

The Pullman shops at St. Louis, recently burned, are to be rebuilt. A force of men is now clearing the ground, preparatory to the work of rebuilding.

The Excelsior Iron Works Co. are working to full capacity in the making of mine hoisting and brick pressing machinery. They are employing nearly 200 men.

Ogden City, Utah, is anxious to become a pig iron producer, and active steps are being taken looking to the building and operation of a blast furnace at that place.

It is reported that the Rogers Fence Co., of Springfield, O., have been offered $60,000 to locate in Minneapolis, Minn., but decline to make the change for less than $100,000.

The Kilby Manufacturing Co., of Cleveland, manufacturers of sugar-making and all classes of heavy machinery, engines, etc., report that they are running night and day, and full of orders.

The Brown Hoisting & Conveying Co. will shortly erect a large plant at Buffalo. This company is now employing 350 men, but in the near future will employ nearly 500. Report they are very busy, with large number of orders on their books.

The Webster, Camp & Lane Machine Co., Akron, O., have just completed and shipped four car loads of hoisting machinery to Buffalo, for the Brown Hoisting & Conveying Co., to be used on a plant the latter company is building for the Lehigh Valley Railway Co.

The Lunkenheimer Brass Manufacturing Co., Cincinnati, O., announce that they have purchased the entire plant and good will of the Porteous Brass Manufacturing Co., of that city, manufacturers of brass goods, gate valves, etc., and that the machinery and tools have been removed to their new addition,

Nos. 11 and 13 East Eighth street, greatly increasing their facilities for the production of engine builders' and steam fitters' brass work, as well as their various well known specialties in valves, lubricators, oil cups and grease cups.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock P. M., on the 24th day of March, 1891, for all the labor and materials, and fixing in place complete, the low-pressure steam heating and mechanical ventilating apparatus, for the U. S. Postoffice, etc., building at Brooklyn, N. Y.

H. K. Porter & Co., Pittsburgh, Pa., have under construction a small locomotive for hauling salt on an island in the Gulf of California. The island has no springs or streams, and as rain is unknown, the salt is piled in the open air without loss. All the water for operating the locomotive is brought along distance across the gulf, and the locomotive, in addition to hauling salt cheaper than it can be done by mules, will save a great deal in the amount of water used, and cheaper cost of fuel as compared with mule feed.—[American Manufacturer.

Mr. Frank De H. Robison, the genial president of the Cleveland City Cable Railway Co., is highly pleased with the crude oil furnaces in the company's power house. A visit to the boiler room is quite a contrast to one where coal is in use. On Sunday morning, March 1st, the Cleveland City Cable Railway Co. changed one of their drums in six hours, which is claimed to be the quickest time ever made in doing work of that kind. The engines were closed down at 1 o'clock A. M. sharp—the first time they have stopped since starting, December 10—and started again at 7 A. M., sharp.

Barb Wire Patents.

The consummation of the negotiations with reference to the acquirement of the barb wire patents by the Columbia Patent Co. is not yet announced, but it is intimated that these negotiations are progressing satisfactorily, and there is little doubt of their successful termination in a way that will be in accordance with the interests of all concerned. It should be borne in mind, however, that these negotiations do not look to the forming of a trust or the control of prices or production. A number of misleading statements on this point have appeared in the daily press in different parts of the country. If the matter of patents is satisfactorily adjusted, it is, of course, not unlikely that the manufacturers will see their way clear to taking further united action for a continuance of their interests, and the giving of regularity to a market which, for a long time, has been exceedingly uneven, with prices in many cases unprofitably low. The present negotiations, however, concern simply the ownership of the patents, and the formal consummation of the matter has not yet been accomplished.—[Metal Worker.

Liquid Fuel.

A paper read a few days ago before the Shipmasters' Society, of London, is attracting considerable attention in shipping circles. The author, Captain Carmichael, has had much experience in the use of such fuel in steamers on the Pacific Coast of South America, and he has been able to give the results of this in a very interesting paper. Already liquid fuel is in use in the locomotives of one of our railways, but for heating marine boilers its advantages are extraordinary. Furnaces become almost self-firing, and the steam is entirely under the control of the engineer on watch. The space now needed for immense coal bunkers can largely be devoted for the stowage of cargo, and in cases of long voyages, would be of the utmost importance.—[Iron and Steel Trades Journal, London.

THE Carbon Iron Co., of Pittsburgh, have recently made some experiments in the manufacture of steel by introducing an amount of aluminum into the charge in the furnace. The experiments were on a very small scale, but the results obtained were highly satisfactory. The firm purpose to conduct similar experiments on a more extensive scale in the near future.

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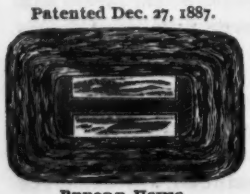

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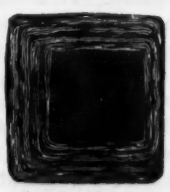

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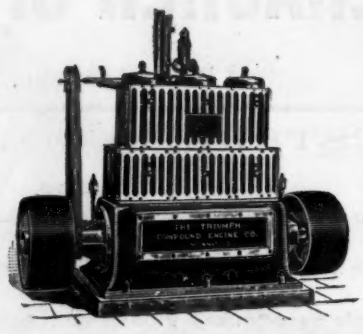

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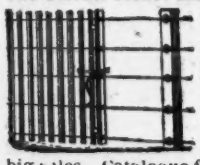

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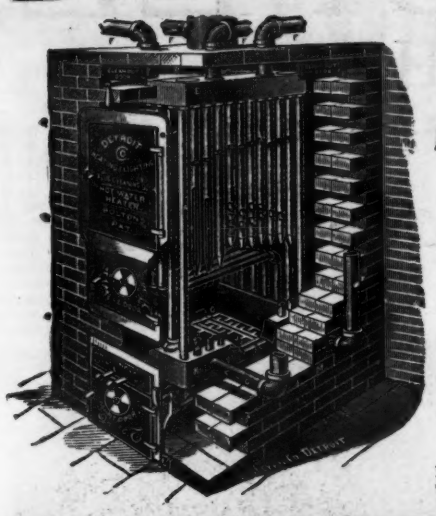

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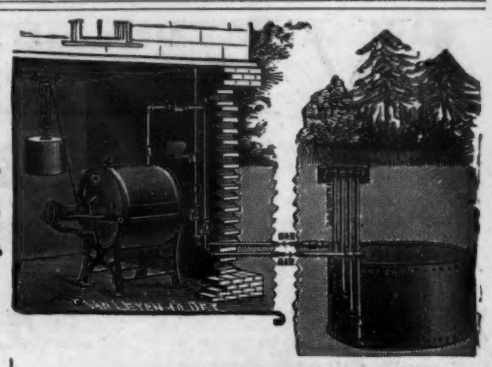


COMBINATION Gas Machine

Best Independent Gas Apparatus

For Country and Suburban Residences, Churches, Schools, Stores, Hotels, Etc.

Over 20 Years in use, with never an Accident.

Average cost of gas, ½ cent per hour per burner.

PERFORATED METALS OF EVERY DESCRIPTION BY THE HARRINGTON & KING PERFORATING CO. CHICAGO.

284 Pearl St., cor. Beekman. NEW YORK.

TO THOSE LOOKING FOR MANUFACTURING SITES.

The most desirable locations for the manufacture of wagons, stoves, horse and mule shoes, boiler plate, sheet iron, agricultural implements, furniture, or for foundries, machine shops, rolling mills, muck bar mills, nail works, glass works, cotton or woolen mills, pipe foundries, wrought iron pipe works, tanneries, or other manufacturing establishments, are to be found in Virginia, along the line of the Norfolk & Western Railroad, from Norfolk, Va., or Hagerstown, Md., to Bristol, Tenn., and upon its Clinch Valley, Cripple Creek, and Ohio extensions. Hardwood in every variety; pig iron from the furnaces at Lynchburg (2), Roanoke (3), Pulaski (1 in operation and one under construction), Ivanhoe (1), Radford (1 now under construction), Salem (1), Graham (1), Max Meadows and Bristol (1 at each point now under construction), Shenandoah (1), Buena Vista (1); bar iron from the rolling mills at Richmond, Shenandoah (now under construction), Lynchburg, Roanoke and Richlands (now under construction); coke and semi-bituminous coal from the Pocahantas coal and coke field; superior gas coals from mines on the Clinch Valley Extension; glass sand near Tazewell and Buena Vista; cotton from the markets of the Southern States, and wool from all the Western and Southwestern States and Territories, at advantageous freight rates. Favorable freight rates made upon raw materials to all factories established upon its line, as well as to points in the United states and Territories, upon the manufactured articles.

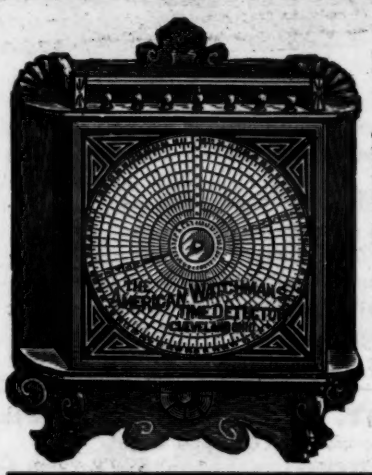
Those seeking new fields for manufacturing establishments should not fail to investigate the wonderful development of iron, coal and coke industries that has been made within the past five years along the line of the Norfolk & Western Railroad, and the advantages offered by the State of Virginia in the supply of raw materials, by the Norfolk & Western Railroad Co. in the matter of freight facilities and rates upon raw materials, and reaching home, far distant and foreign markets, and by the cities and towns along its line in the way of advantageous sites at moderate cost. Many of the cities and towns exempt manufacturing establishments from taxation for a series of years.

For further information as to freight rates and sources of supply of raw material, maps, pamphlets, etc., apply to A. POPE, General Freight Agent, or to

CHAS. G. EDDY, Vice-Pres't,
ROANOKE, VA.

PORTBLE, HAND OR BELT **PIPE CUTTING & THREADING MACHINE.**

Double Application of Power. Double Leader Screw
Instantly Changeable, range from 1 to 6 in. Pipe.
Write for Description and Prices
WELLS MACHINE WORKS, FOSTORIA, O.



THE AMERICAN
WATCHMAN'S TIME DETECTOR.

This Electrical instrument, which is operated by either battery or magneto generator as preferred, is designed to, and does, keep an exact record of the doings of the Night Watchman in any establishment whereit is in use. It is an active and faithful guardian of your premises during the night. It is simple, reliable and absolutely infallible. Cannot be tampered with without certain detection.

Thousands of testimonials from the first concerns in the land. Send for catalogue to

The Cleveland Electrical Mfg. Co.,
44 and 46 Sheriff Street,
CLEVELAND, O.

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THE BRUSH ELECTRIC CO.,

Sole Manufacturers under all the
PATENTS OF CHARLES F. BRUSH, FOR ELECTRIC LIGHTING, STORAGE BATTERIES, CARBONS, ELECTRO-PLATING MACHINES, ELECTRO MOTORS, ETC.

The Brush Light Still Leads the Field.

No other System in the World equals ours in Simplicity, Durability, Earning Capacity, Reliability. The Best is always the Cheapest.
45,000 Brush Arc Lamps now in use. Self-Regulating Incandescent Apparatus.

GET OUR AGENT TO MAKE PLANS FOR YOU BEFORE BUYING ELSEWHERE.

THE BRUSH ELECTRIC CO.,
CLEVELAND, OHIO, U. S. A.
Agencies Everywhere.

IRON FOUNDRY

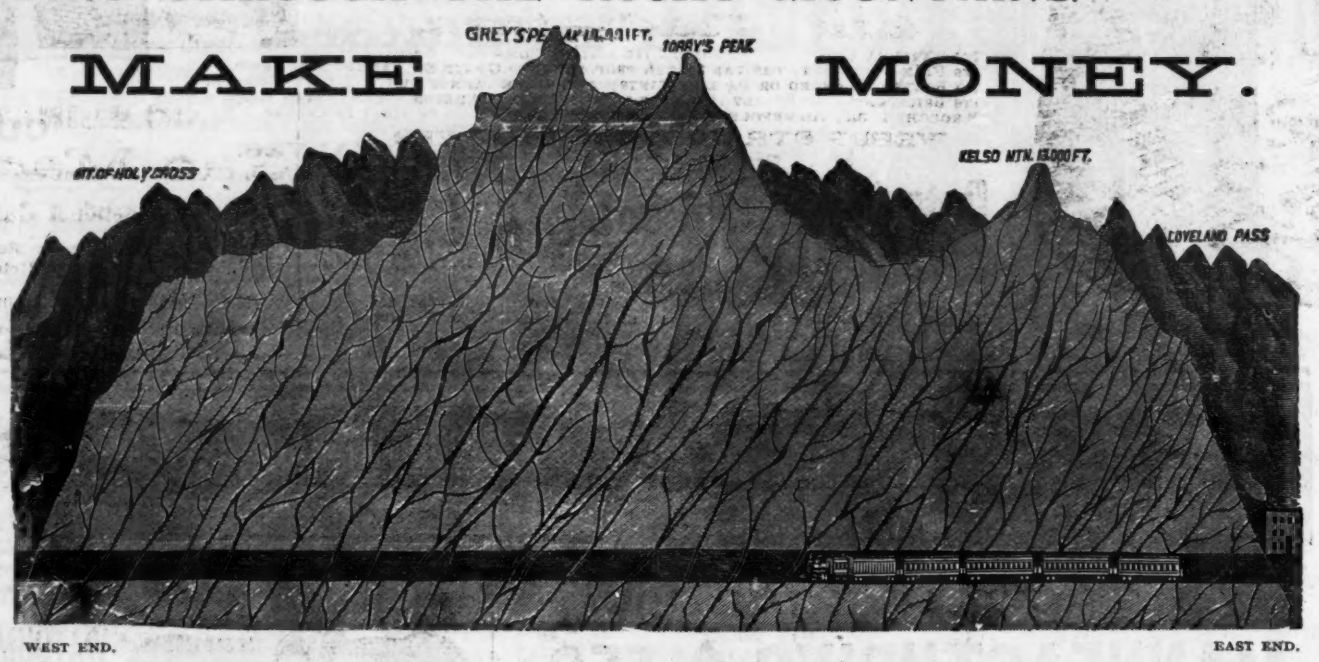
CANTON IRON FOUNDRY CO.,
Canton, Ohio.
HEAVY AND LIGHT CASTINGS.
Privilege to make estimates solicited.

WE, THE PEOPLE,

ARE IN IT FOR WEALTH.

CUTTING THROUGH THE ROCKY MOUNTAINS.

MAKE MONEY.



Showing what the Atlantic-Pacific Railway Tunnel Company is doing to open a tunnel or gateway through the backbone of the American Continent, so cars can run direct from Denver, Colorado, to Salt Lake City, Utah, and shorten the railway distance more than 230 miles between these two cities.

This picture shows how it is done. The object is threefold.

1. To get access to more than 250 rich veins of gold and silver ore, that form the great mineral belt of Colorado, and that are here found, standing as shown in the above cut More than 250 of these fissure veins have already been discovered at the surface. They come, up following volcanic action, from the center of the earth. From these veins thousands of tons of gold and silver ore can be can be brought out through the tunnel each day for market, and sold for the benefit of all who own shares issued by the Atlantic-Pacific Railway Tunnel Company.

2. To open a gateway for railway purposes through the main, snow-capped range of the Rocky Mountains, to a point due west from Denver.

3. To open a section of country west from Denver, between the Rocky Mountains, comprising western Colorado and eastern Utah. This section, an area larger than the State of New York, will thus be opened to business and civilization, and made directly and easily accessible from Denver.

The cut shows the manner of getting into the hundreds of veins the tunnel is cutting through so that they can be driven into, to the right and left of the tunnel. Thus their contents of gold, silver, copper and lead, worth in cash from $100 to $3,500 per ton, can be mined out under cover the year around, dumped directly into the railway cars and run to Denver, 60 miles, direct into the smelters, without extra charge for repeated handling and wagon transportation.

These mineral bearing veins are from one to thirty feet in width. Their contents vary in thickness and quality, but the average exceeds four feet, and the average value exceeds $200 per ton.

These veins are thus opened at greater depths than any mines in the world have ever been descended into.

BETTER THAN 8 PER CENT.

The Atlantic-Pacific Railway Tunnel Company

Incorporated in 1884 to buy land, mines, mill sites, water powers, machinery, etc., in Colorado, to pay for the same in shares or money; to open mines and carry on the business of mining and treating of ores; to open a tunnel, and operate the same for mining as well as general railway purposes later on.

Under and in strict conformity with its charter it has authorized the issuance of 700,000 SHARES OF THE PAR VALUE OF $10 each. It has disposed of about 500,000 of its shares for valuable properties in the counties of Clear Creek and Summit, Colorado, and for such cash as has thus far been used to develop and improve its properties.

Its shares are full paid, and no taxes or assessments can be laid against them, and, therefore, no act of the Company can deprive one person of his share or shares for the benefit of others.

Two hundred thousand shares still in its treasury for sale, as the Company offers them for improvement purposes.

MORE THAN 4,600 men, women and children now jointly interested as share owners, and, therefore, members of the Atlantic-Pacific Railway Tunnel Co.

☞The Company has more than four millions of dollars' worth of property all fully paid for.

☞All its interest obligations are met promptly as they mature.

More than 5,000 feet of tunnel already driven, including 3,100 feet on the east side of the Rocky Mountains, 60 miles due west from Denver, Colo, and more than 1,400 feet of tunnel driven into the west side of the mountains, as well as side tunnels into veins.

Main tunnel, when completed for railway use, will be 25,200 feet long.

More than $2,000,000 worth of gold, silver, copper and lead owned by this Company, already in sight, to be marketed in the future.

Work going on in the tunnel and in the mines day and night.

More than 250 rich, large veins of mineral, gold, silver, copper and lead are being cut by this tunnel, at depths ranging from 1,000 to 4,400 feet below their surface, so that millions of dollars' worth of the precious metals can be brought out each year and sold, the profits all going to share owners in exact proportion to the number of shares each person owns.

Full paid, non-assessable, non-taxable shares in the above-named Company, making the purchaser a MEMBER OF THE COMPANY and a JOINT OWNER in all the rights, properties, franchises and profits from sale of ore, land and mineral, and from all rentals as they accrue. These shares are of the PAR VALUE OF $10 EACH. Present selling price, $6 each, but no fewer than TWO SHARES will be sold at a time. No personal liability to share owners, and no running in debt by the Company.

On money thus invested, the investor will receive FIFTY CENTS A YEAR CASH as interest on each guaranteed share making 8 1-3 per cent. yearly interest on the sum actually invested, and as the Company makes the money to pay large dividends or interest, it will be paid. But FIFTY CENTS A YEAR CASH INTEREST can be counted on to a certainty. It will not be long before a steadily increasing rate of interests or dividends will be paid.

Every dollar promised as dividends on guaranteed shares named above, paid. Any person can become a joint owner in this, the greatest mining enterprise in the world, who can pay for two or more shares and have as many votes in all affairs of the Company as he or she owns shares.

Investment safe, certain and increasingly profitable. Each investor, man, woman or child, becomes one of a great co operative association where capital and labor are in harmony and each alike protected. Any one can invest. Shares issued direct to the purchaser the day the pay therefor is received, and at the end of each year from the date of issuing the shares, the interest will be promptly remitted. Price $6 each. No fewer than two shares sold at a time.

Eight per cent. Bonds, First Mortgage,

are also offered; the entire proceeds arising from sale of bonds or shares going to increase the properties of the Company. Bonds $250 and $1,000 each. Interest payable in cash March 1st and September 1st each year till 1907, when the principal will be paid. Interest on bonds paid by sale of gold, silver and lead taken from the properties of the Company. With each bond is given an option for the purchaser to exchange it for shares when the Company prove it will be best for the investor to exchange if he wishes to. $1,700,000 of these A1 securities yet for sale, out of $2,000,000 authorized.

NOTE THESE FACTS—All properties fully paid for. All interest obligations fully paid. Work going on in both ends of the tunnel all the time, bringing silver and lead ore from both ends of the tunnel. All debts of the Company for interest supplies, labor, taxes, etc., to date of March 1, 1891, fully paid.

Four contractors working at east end of tunnel—one in tunnel work, the others opening mineral veins—and one contractor at west end. An additional plant of (steam and water motor) 240 horse-power ordered for east end of tunnel, to be used exclusively for mining—the present one being used for tunneling purposes.

There is no better, safer or more permanently valuable enterprise than this in the world. In time it will pay 100 per cent. each year on the investment.

Bonds sold only at par, counting interest from date of investment.

A large illustrated 16-page pamphlet describing the great work, and many endorsements of leading newspapers, sent to all who apply, enclosing a two-cent stamp, and giving name and postoffice address. Address all orders or letters of inquiry to

M. M. POMEROY, Pres't.

ROOMS 46, PULITZER BLDG.,
March 10, 1891. NEW YORK CITY.

IRON AND STEEL MARKETS.

PIG IRON.

CLEVELAND (f. o. b. cars, net cash) Bessemer, $17 30; No. 1 Foundry, $16 80; No. 2 Foundry, $15 80; No. 1 Gray Forge, red short, $14 80; No. 2 Gray Forge, neutral, $14 30; No. 1 American Scotch, $16 80; No. 2 American Scotch, $15 80.

CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1 foundry, $16 25@17 00; Southern Coke No. 2 Foundry, $15 75@16 50; Southern Coke No. 3 Foundry, $15 25@16 00; Southern Coke No 1, Softeners, $15 75@16 50; Southern Coke No. 2, Softeners, $14 75@15 50; Ohio Silveries No. 1, $18 00@18 75; Ohio Silveries No. 2, $17 00@ 17 75; Ohio Strong Softeners No. 1, $18 25@19 50; Ohio Strong Softeners No. 2, $17 50@18 75; Lake Superior Charcoal Nos. 1 to 6, $18 00@19 00; Tennessee Charcoal No. 1, $18 00@19 00; Tennessee Charcoal No. 2, $17 50@18 50; Southern Standard Car Wheel, $21 00@23 00; Tennessee Standard Car Wheel, $00 00@00 00.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $15 00@15 25; Hanging Rock Coke, No. 1 foundry, $16 50@17 50; Jackson Co. Stone Coal, No. 1 foundry, $16 50@17 00; Tennessee Charcoal, No. 1 foundry, $16 50@17 50; Hanging Rock Charcoal, No. 1 foundry, $20 00@22 00. MILL IRONS—Standard Southern Coke, grey forge, $13 25@13 75; Standard Southern Coke, mottled, $13 00@13 25; Cold Short Southern Coke, grey forge, $12 75@13 00; Strong Ohio Neutral Coke, grey forge, $15 00@15 50. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $20 00@20 50; Tennessee Car Wheel, $18 50@19 50; Lake Superior Car Wheel, $19 50@20 50.

BUFFALO (reported by Rogers, Brown & Co.): Mahoning and Shenango Valley strong, No. 1 Foundry, $17 00@00 00; Mahoning and Shenango Valley strong, No. 2 Foundry, $16 00@00 00; Ohio Softener No. 1, $17 00@00 00; Ohio Softener No. 2, $16 00@ 00 00; Jackson Co. Silveries, $18 00@00 00; Lake Superior Charcoal, $20 00@00 00; Tennessee Charcoal, $19 00@00 00; Southern Softener No. 1, $16 50@00 00; Southern Softener No. 2, $15 75@00 00; Southern Strong No. 1 Foundry, $17 00@00 00; Southern Strong No. 2 Foundry, $16 25@00 00; Alabama Car Wheel, $22 25@23 00; Hanging Rock Charcoal, $23 00@24 00

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $14 25@14 50; Southern coke No. 2, $13 75@14 00; Southern coke No. 3, $13 25@13 50; Mahoning Valley (Lake ore mixtures), $00 00@00 00; Southern charcoal, No. 1, $16 50@17 00; Southern charcoal, No. 2, $16 00@16 50; Missouri charcoal, No. 1, $17 50@18 00; Missouri charcoal, No. 2, $17 00@17 50. FORGE—Neutral coke, $12 50@13 00; Cold short, $12 50@13 00; Mottled, $12 00@12 25. CAR WHEEL AND MALLEABLE—Southern (standard brands), $21 00@22 00; Southern (other brands), $17 50@18 00; Lake Superior, $21 50@22 50.

ST. LOUIS (reported by Rogers, Meacham & Shields): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 75@16 25; Southern Coke No. 2, $14 75@15 25; Southern Coke No. 3, $14 25@14 75; Southern Grey Forge, $13 75@14 25 Southern Charcoal No. 1, $17 50@18 00; Southern Charcoal No. 2, $17 00@17 50; Missouri Charcoal No. 1, $15 50@16 00; Missouri Charcoal No. 2, $15 00@15 50; Ohio Softeners, $18 00@19 50. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $20 00@20 50; Southern, $19 00@21 00. CONNELLSVILLE COKE—East St. Louis, $5 50; St. Louis, $5 65.

DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $19 00@19 50; Lake Superior (coke) Bessemer, $18 00@18 50; Katahdin (Maine Bessemer), $23 00@24 00; Lake Superior Coke, Foundry, all ore, $18 00@18 50; Lake Superior Coke, Foundry, all ore, $00 00@00 00; Standard Ohio Black Band, $18 00@18 50; Southern No. 1 $16 00@16 26; Southern Gray Forge, $14 25@15 00; Jackson County (Ohio) Silvery, $18 25@18 75; Old Car Wheel, $00 00@00 00. Connellsville Coke, $4.65.

LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 25@14 75; Southern Coke No. 2 Foundry $13 75@14 25; Southern Coke No. 3 Foundry $13 25@13 75; Grey Forge, $12 75@13 25; Southern Coke Silver Grey, $00 00@00 00; Southern Charcoal No. 1 Foundry, $16 00@17 00; Car Wheel, $17 00@20 00.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $16 75@17 00; No. 2 Foundry, $15 75@16 00; Grey Forge, $15 00@15 25; White and Mottled, $14 00@14 25; Warm Blast Charcoal, $18 00@20 00; Cold Blast Charcoal $22 00@27 00; Bessemer, $16 75@17 00.

MERCHANT IRON AND STEEL.

Flat Bar

1½ to 4 by ⅜ to 1 inch	1 80
4½ to 6 by ⅜ to 1 inch	1 90
1½ to 6 by 1¼ to 2 inch	2 20
1¼ & 1¾ by ⅜ to ¾ inch	1 90
1 & 1¼ by ⅜ to ¾ inch	2 00
⅛, ¾ and ⅜ by ⅜ to ½ inch	2 20

Round and Square.

1 to 1¾ inch	1 80
2 to 2¾ inch	2 00
2¾ to 3¾ inch	2 10
3¾ to 4 inch	2 80
4¼ to 4¾ inch	3 20
4¾ to 5 inch	3 50

Oval.

⅜ to 1¾ inch	2 70
½ to ¾ inch	2 0
⅝	2 60
¾	3 00

Half Oval and Half Round.

1⅛ to 3 inch	2 90
⅜ to 1¾ inch	2 50
½ to ¾ inch	3 10
⅝	3 20
¾	4 80

Heavy Band.

¼ to 6 by ¼ and 5-16 inch	2 00
⅛ to 1⅜ by ¼ and 5-16 inch	2 10
½ to ⅞ by ¼ and 5-16 inch	2 30
to ⅞ by ½ and 5-16 inch	3 80

Hoops.

1¼ to 4, Nos. 13 to 15	2 60
1¼ to 2, Nos. 16 to 18	2 70
1¼ to 2, No. 19	2 80
1¼ to 2, No. 20	2 90
1¼ to 2, No. 21	3 00
1¼ to 2, No. 22	3 10
15-16, 1 and 1⅛, Nos. 13 to 15	2 80
15-16, 1 and 1⅛, Nos. 16 to 18	2 90
15-16, 1 and 1⅛, Nos. 19 and 20	3 00
15-16, 1 and 1⅛, No. 21	3 10
15-16, 1 and 1⅛, No. 22	3 20
⅞, Nos. 13 to 15	3 00
⅞, Nos. 16 to 18	3 10
⅞, Nos. 19 and 20	3 20
⅞, No. 21	3 30
⅞, No. 22	3 40
13-16, Nos. 13 to 15	3 20
13-16, Nos. 16 to 18	3 30
13-16, Nos. 19 and 20	3 40
13-16, No. 21	3 50
13-16, No. 22	3 60
¾, Nos. 13 to 15	3 30
¾, Nos. 16 to 18	3 50
¾, Nos. 19 and 20	3 60
¾, No. 21	3 70
¾, No. 22	3 80
11-16, Nos. 13 to 15	3 50
11-16, Nos. 16 to 18	3 70
11-16, Nos. 19 and 20	3 80
11-16, No. 21	3 90
11-16, No. 22	4 00
⅝, Nos. 13 to 15	3 80
⅝, Nos. 16 to 18	4 00
⅝, Nos. 19 and 20	4 10
⅝, No. 21	4 20
⅝, No. 22	4 30
⅝, No. 23	4 50

Light Band.

1⅛ to 6 by ⅛ to 3-16 in	2 20
1⅛ to 6 by Nos. 11 and 12	2 30
1 to 1¾ by ⅛ to 3-16 in	2 40
1 to 1¾ by Nos. 11 and 12	2 50
⅞ and 13-16 by ⅛ to 3-16 in	2 70
⅞ and 1 3-16 by Nos. 11 and 12	2 80
¾ and 11-16 by ⅛ to 3-16 in	3 00
¾ and 11-16 by Nos. 11 and 12	3 10
⅝ and 9-16 by ⅛ to 3-16 in.	3 20
⅝ and 9-16 by Nos. 11 and 12	3 40
½ by ⅛ to 3-16 in	3 60
½ by Nos. 11 and 12	3 70

Wagon Box Iron.

⅛ inch, beveled edge, by Nos. 11 and 12	2 80
⅛ inch, " " " 13 and 14	3 00
¼ inch, " " " 11 and 12	3 10
¼ inch, " " " 13 and 14	3 30

Sheet Iron:

No. 10 to 14	2 65
No. 15 to 17	2 75
No. 18 to 21	2 99
No. 22 to 24	3 15
No. 25 to 26	3 30
No. 27	3 40
No. 28	3 50

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 60
C No. 1, " "	2 85
C H No. 1 " "	3 10
C H Flange, " "	3 85
Extra Flange, "	4 35
Solid Fire Box "	5 10

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 75
Shell	3 15
Flange	3 45
Marine Flange	3 85
Fire Box	4 55

Above includes plates 90 inches wide.

90 to 96 in. wide	½c lb extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1½c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs
1 to 2 in. inclusive	09
9-16 to ⅞ in "	09
7-16 to ⅝ and 2⅜ to 3 in	10½
3⅛ to 4 in	11
⅝ to 11-16 and 4⅛	10½
2⅛ to 6 in	11½
¼ to 9-32 and 6⅜ to 7 in	12
3-6 in	14

Flats.

	cts. lbs
2 to 9-16 wide by 2 to ⅝ thick	9

Bessemer and O. H. Steel.

Machinery	base price,	2 75
Tire	"	2 75
Spring	"	3 25
Sleigh Shoe	"	2 75
Toe Calk	"	3 00
Cutter Shoes, tapered and burr.	"	3 00

English Tool Steel.

Jessop's	16c
Hobson's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

⅛, ¼, 11-16 and ¾ inches diameter	4 00
Bridge ⅛, ¼, 11-16 and ¾ inch diam	4 00

SCRAP IRON AND OLD METAL.

	NET TONS
No. 1 R. R. wrought scrap	$19 00
No. 1 wrought scrap	17 00
No. 1 Machine cast scrap	12 00
Iron axles	24 00
Axle turnings	13 50
Wrought turning (free from cast)	12 00
Cast borings	8 00
Uncut wrought iron boilers	11 00
Steel boiler plates	17 00
Grate Bars	8 00
Pipes and flues (Clean)	13 50
Tank iron	13 50
Hoop and band iron	10 00
Sheet iron	9 50
Wrought drillings	11 00
Malleable iron	10 00

Reported by Messrs. BLACK & POLLOCK, Cincinnati, O.:

Railroad Wrought	$20 00
No. 1 Country Wrought	17 00
Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	12 00

CLEVELAND ROLLING MILL CO.,
MANUFACTURERS OF
BESSEMER STEEL RAILS,
Blooms and Billets, Steel Angles, Forgings, Bar and Spring Steel. Steel Street Rails, Steel Oil Barrel Hoops, Wire of all Kinds, Iron and Steel Boiler Plates, Galvanized and Black Sheet Iron, Corrugated Iron Roofing, Sheet Steel.

THE CAMBRIDGE IRON & STEEL CO.
MANUFACTURERS OF
SHEET IRON AND SHEET STEEL
Squared Roofing Sheets a Specialty.
CAMBRIDGE REFINED IRON. TRADE MARK
CAMBRIDGE SOFT STEEL. TRADE MARK
CAPACITY RANGES FROM No 30 26 INCHES WIDE TO 1-4×40×120
CORRESPONDENCE SOLICITED
OFFICE AND WORKS CAMBRIDGE, OHIO.

Magnetic Concentration of Iron Ore.
Ball-Norton (Monarch) Electro Magnetic Separator.
Phosphorus, sulphur, silica, hornblende and other impurities eliminated from Iron Ore, and non-Bessemer ore converted into Bessemer Ore. Samples treated without charge. Correspondence solicited.
H. E. COLLINS & CO., Agents Magnetic Separator Co.,
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"Elastic Rotary-Blow Riveting Machine.
JOHN ADT & SON,
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Builders of Machinery for Hardware Manufacture,
AUTOMATIC
Wire Straightening and Cutting Machines,
Butt Milling Machinery, Butt Drilling Machinery Riveting Machines, Drilling and Countersinking Machines, Foot Presses, Sprue Cutters, Etc.

DALLIBA, CORRIGAN & CO.,
DEALERS IN
Iron Ore & Pig Iron,
Rooms 716, 717, 718, 719 Perry-Payne Bld'g,
CLEVELAND, O.

OGLEBAY, NORTON & CO.,
Successors to Tuttle, Oglebay & Co.,
Commission Dealers in
Iron - Ores,
FROM MARQUETTE, GOGEBIC AND MENOMINEE DISTRICTS,
CLEVELAND. OHIO.

J. H. OUTHWAITE. W. G. POLLOCK.
J. H. OUTHWAITE & CO.,
Exclusive attention given to
LAKE SUPERIOR AND MENOMINEE RANGE
Iron Ore,
Perry-Payne B'ld'g. Cleveland, O.

THE CONDIT-FULLER CO.,
Pig and Bar Iron,
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COMMISSION DEALER IN
Iron Ore, Pig Iron
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MINERS AND SHIPPERS OF
Ohio Steam Coal and Coke.
Mines on the Cleveland, Lorain & Wheeling R. R. Capacity, 3,000 tons daily.
Office, 6 Mercantile Bank Building,
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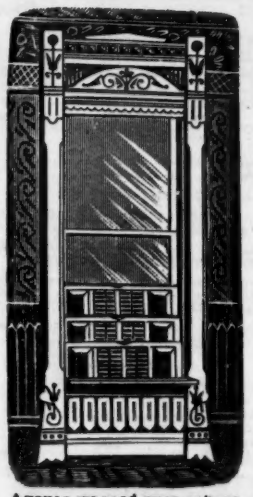
Lake Shipping Point, Lorain O.
JAS. PATTERSON, Sales Agent.

Hartman's Patent Inside Sliding Window Blind

is the most popular Blind in America. Architects & builders prefer it to any other, for merit, style, convenience and economy.
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Hackles, Preparing Machines, Twisters, Forming Machines, Laying Machines, Finishing Machines, Carding Machines, Taring Machines, and Balling Machines for either Hemp, Sisal, Jute or Manila. Correspondence solicited.
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Pure Aluminum
$1.25 PER POUND.
Quality guaranteed equal to any on the market. Manufactured by
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Cowles Aluminum Brass,
Cowles Silver Bronze,
Cowles Silicon Bronze,
Cowles Aluminum Iron
INGOTS AND CASTINGS.
Correspondence olicited.

MACHINERY SUPPLY MARKET.

Anvils.

American.....₩ lb 9@10
Wrights.....₩ lb 12

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's.....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shults Raw Hide Leather Belting, single.....dis 40
Shults Raw Hide Leather Belting, double, and Light Double.....dis 40
Standard, oak tanned.....dis 50@60
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.,.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 9¾@10¾

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3¾

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¾".....dis 50&10
Morse Taper and Straight shank Larger than 1¾".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
¼ kegs ₩ lb	4¼c	5¼c		2¾c
½ kegs ₩ lb	4½c	5½c		3 c
10 lb cans, 10 in case	6 c	6½c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@50&5

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
ndustry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	3¼
Hexagon	15¾	11¾	8¾	6	5¼	5¼	5
Washers	9	8	7	5	4½	4¼	4¼

In lots less than 100 lbs, ₩ lb add ¼c., 1lb boxes add 1c to list.

Nails (wire.)

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate
{ Car lots.....$2.30 / Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 48

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ¼ inch and over.....₩ lb 13¾
Sisal, ¼ inch and over .....₩ lb 13¾

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40@45
" Band.....dis 20
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 20
Atkins' Circular Saws.....dis 40&45
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 23c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—List Jan 27, 1889.

Flat head iron.....dis 50
Round head iron.....dis 40
Flat head brass.....dis 45
Round head brass.....dis 35
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine,	BC.	B.
No. 12, Flax Twine, ¼ and ½ lb Balls	21c@29c	
No. 18 " " ¼ and ½ "	18c@28c	
No. 36 " " ¼ and ½ "	16c@27c	
2-Ply Hemp, ¼ & ½ lb Balls (Spring Twine)	11¼c	
3-Ply " 1lb Balls	12@12¼c	
3-Ply " 1½ lb Balls	11@11¼c	
Cotton Wrapping, 5 Balls to lb	15@16c	

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 10@15
Howard.....dis 30

Wire.

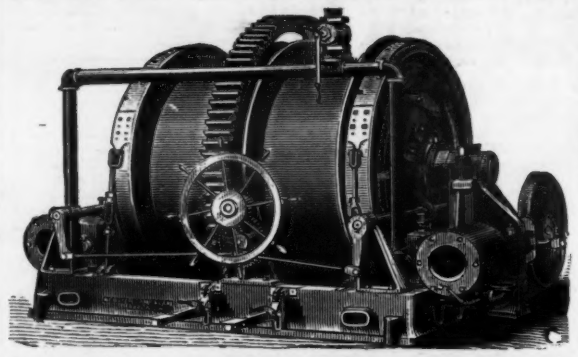
New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " " .....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00@lb dis 3

Wrenches.

Coe's genuine.....dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 3
Bemis & Call's Combination.....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 10
William's " " .....dis 10
Alligator " " .....dis 40

Webster, Camp & Lane Machine Co.



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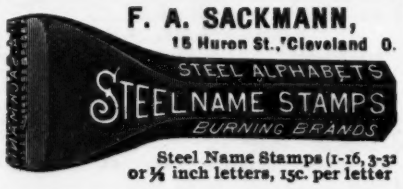

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For handling materials of all kinds.

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PATENTS

WM. M. MONROE,

SOLICITOR & COUNSELLOR, City Hall Room 48.

PATENTS THOMAS P. SIMPSON, Washington, D. C. No atty's fee until Patent obtained. Write for Inventor's Guide.

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HARDWARE MARKET.

Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ₩ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ₩ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....₩ doz $8 00
Others.....₩ doz $7 00
Full polished.....₩ doz $9 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 75&10&5
Tire, common, new list.....dis 65
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&10
Loose joint, jap.....dis 70&10
Loose joint, jap. with acorns.....dis 70&10
Loose pin, acorns.....dis 70&10
Loose pin, japanned acorns.....dis 70&10
Loose pin, acorns, jap. plated tips.....dis 70&10
Wrought steel—
Wrought, fast joint, narrow.....dis 70&10
Wrought, fast joint, broad.....dis 70&10
Wrought, loose joint, broad.....dis 70&10
Table Butts, back flaps, etc.....dis 70&10
Regular inside blind.....dis 70&10
Light inside blind.....dis 70&10
Loose pin.....dis 70&10
Light loose pin.....dis 70&10

Carbonized Felt and Building Papers.

(POWERVILLE BRAND.)

Eberts Bros., Detroit.	Per roll of 500 sq. feet.
No. 1—Slaters'	$1.25
"A," Stringed Roofing, Light.	1.50
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"C," Stringed Roofing, Heavy	2.00
Stringed, Rosin-Sized	1.00

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Asphaltum, Trinidad Refined, ₩ ton.....$30.00
Asphaltum, Fine Grade, ₩ lb.....08
Coal Tar Felt, 1 Ply, ₩ lb.....02
Coal Tar Felt, 2 Ply, ₩ roll 108 sq ft.....1.42½
Coal Tar Felt, 3 Ply, ₩ roll 108 sq ft.....1.85
Roofing Pitch, ₩ gal.....09

Chains.

Revised List.

Trace, 6¾-10-2.....₩ pair 1.03
Trace, 6¾-10-3.....₩ pair .92 } .....50&10
Trace, 7-10-2.....₩ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....₩ lb 5¾@6
Jack Chain, Iron.....dis 75&10
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, I. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	3.	5X.
Pails, water, 12 qt.	$4 00	$4 50	$.....
Dairy, 14 qt.	4 50	5 00	.....
Fire 12 qt.	5 00	.....	.....
Sugar	6 00	6 50	.....
Horse	.....	5 00	.....
Buggy	4 00	.....	.....
Chamber, Slop, Commode } 3 and 5X 14 qt.	6 50	7 50	8 50
2 vs. slop. 3 and 5X 14 qt.	8 00	9 00	10 00
Basins, wash—			
10½ inch.	2 00	2 25	.....
12 inch.	2 25	2 75	3 25
13½ inch.	2 75	3 25	3 75
15 inch.	3 25	3 75	4 25
Bowls, fruit	.....	2 50	.....
Servers, 12 in.	.....	2 25	.....
Baskets, waste paper, 13 in.	.....	6 00	.....
Spittons, "Daisy," pressed 8 inch.	4 00	4 50	5 00
10 and 11½ inch.	6 00	6 50	7 50

No. 1 plain; No. 3 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....₩ gross $12, dis 25@25&5

Hanger

Barn door, old patterns.....dis 60&10&10@70
Climax, (Anti-Friction).....dis 60
Scranton.....dis 33—
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $13; 4 in., $10, dis 50&5
Paragon.....dis 40&10
Richard's.....dis 30@30&10

Horse Nails.

No.	10	9	8	7	6	
Ausable, ₩ lb.	23	24	25	26	28	dis 40
Putnam, ₩ lb.	18	19	20	21	23	dis 15
Essex						dis 25&10

Horse Shoes.

Burden, at factory.....₩ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....₩ keg $4 00
Mule Shoes, at factory.....₩ keg $5 00

Knobs.

Carriage, japanned.....₩ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbin, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60&10
Escutcheons and keys.....dis 60&10
Padlocks and padlock keys.....dis 75
Bell pulls, mineral, porcelain and jet dis 60&10
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze...dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....₩ gross $4.80

Plumbs and Levels.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....₩ doz $6 00
Bishop's O K.....₩ doz $5 25
Bishop's Pioneer.....₩ doz $3 75
Bishop's American.....₩ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@$4...dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....₩ gross $15 00

Scales.

Hatch, Counter, No. 171.....₩ doz $21 00
Hatch, Tea, No. 161.....₩ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....₩ doz $18 dis 25

Squares.

Steel and iron, Nickel plated } dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 50&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.

American iron carpet tacks all kinds dis 77½&10
Steel carpet tacks all kinds.....dis 75&10
Swedes iron carpet tacks, all kinds dis 75&10
Swedes iron tacks.....dis 75&10
Swedes iron Upholsterers' tacks.....dis 75&10
Tinned Swedes iron tacks.....dis 77½&10
Tinned Swedes iron Upholsterers' tacks.....dis 77½&10
American iron cut tacks.....dis 77½&10
Copper tacks.....dis 4 &10
Copper finishing and trunk nails.....dis 50&10
Cigar box nails.....dis 60&10
Finishing nails.....dis 65&10
Hungarian nails and miners' tacks...dis 60&10
Gimp and lace tacks.....dis 77½&10
" " " tinned.....dis 60&10
Trunk and clout nails.....dis 72½&10
Tinned trunk&clout nails.....dis 66&10
Basket nails.....dis 66&10
Chair nails.....dis 66&10
Common and patent brads.....dis 66&10

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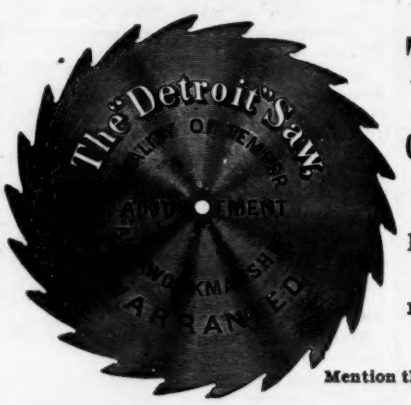

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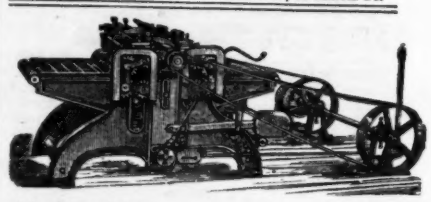

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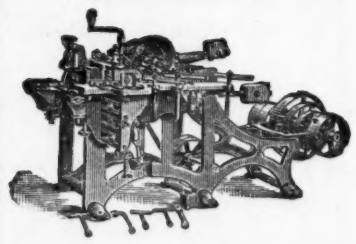

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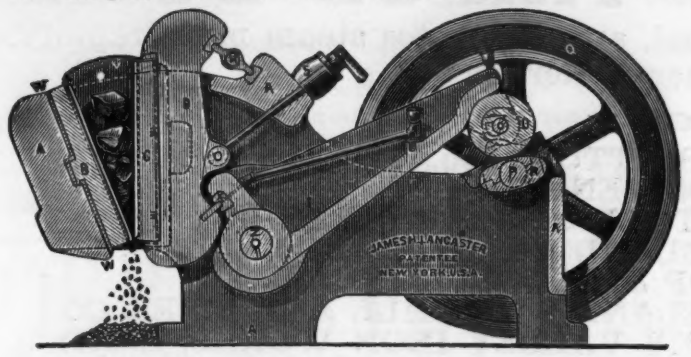

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Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

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Zanesville and Coshocton—10:30 a. m.,6:30 p. m.
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Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 5:30 p. m., 7:10 p. m.
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No. 68, New York & Pitts. Ex.....	*11 00 p m
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No. 67, Pittsburgh Accom.....	*12 45 p m
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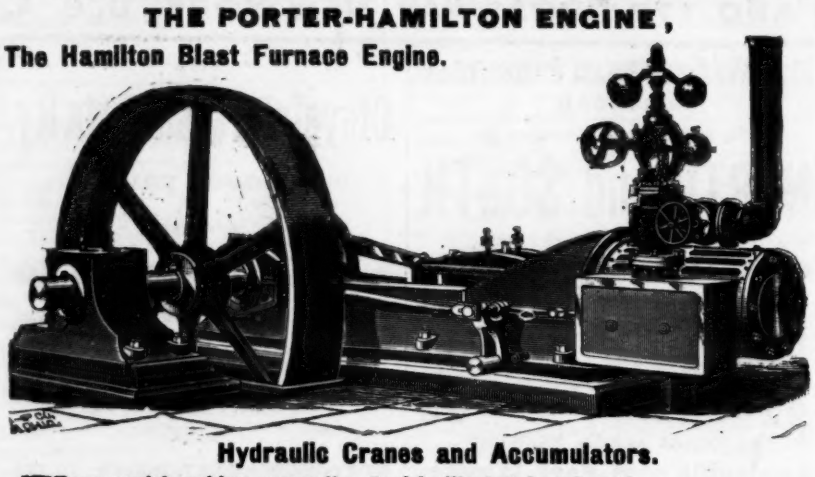

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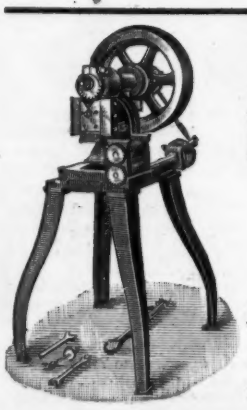

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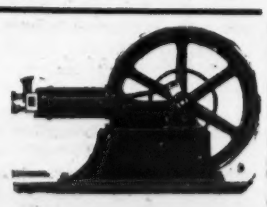

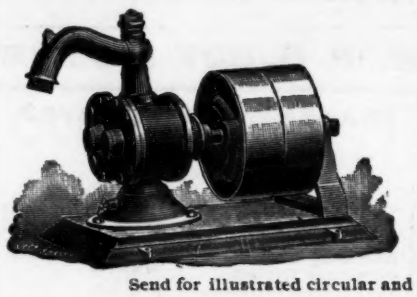

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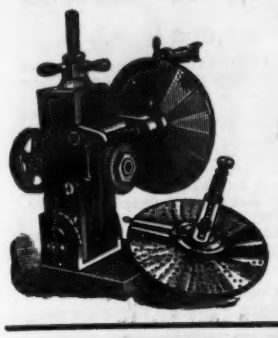

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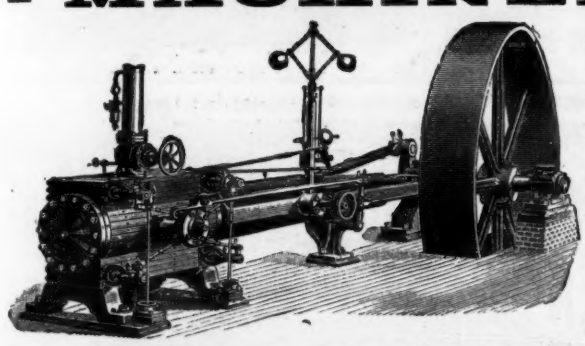

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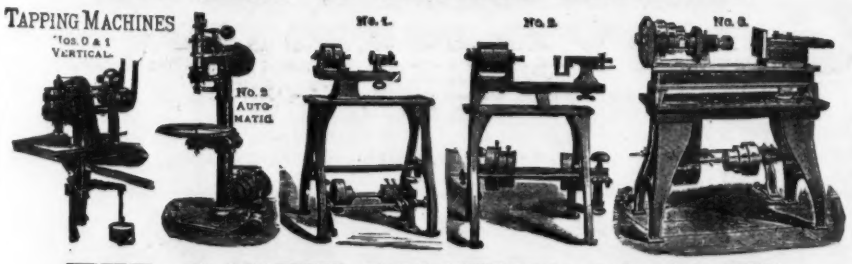

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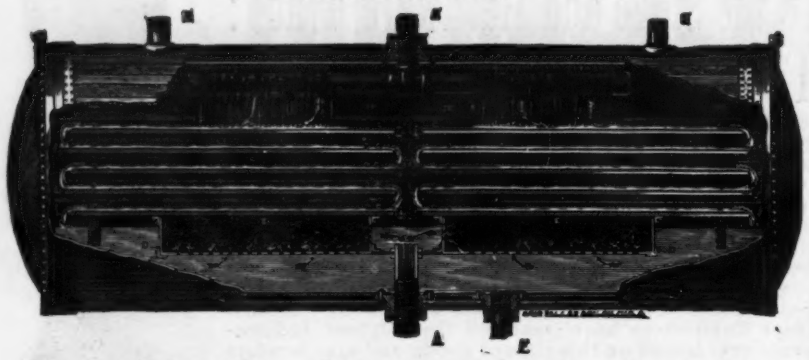

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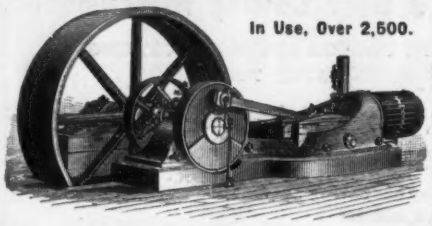

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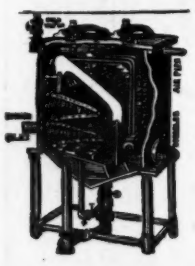

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